



**Forests for Local Economic Development**  
**Albania**

**Wood biomass value chain analysis in four regions of Albania**

*DRAFT FOR COMMENTS*

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April 2017



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## Acknowledgements

This analysis for developing wood biomass value chains in Albania is based on a condensed stakeholder consultation process with a number of key stakeholders and value chain actors, including Ministries, municipalities, administrative units, forest inspectorate, forest associations at different levels, pellet companies, traders, private sector, schools, hospitals and farmers in the four regions of Diber, Korca, Kukes and Shkoder and at the national level in Albania.

The support of CNVP Albania to commission this study and to support the logistical arrangements has been exemplary. In each of the regions visited I received full support of the project staff to arrange consultation meetings as requested, which is immensely appreciated.

I feel blessed to have met and talked with over 60 kind people from various backgrounds and levels; from the farmers in the field, private sector to the decision-makers at the ministerial level. My heartfelt gratitude goes to all for sharing thoughts and views in an open and participative manner on the current wood-biomass situation and potential ways forward.

I hope that this analysis will be helpful to knowledge enhancement and advancing wood biomass development in Albania.

## Abbreviations

CMCP	Communal Micro-Catchment Plans
CNVP	Connecting Natural Values and People
ESP	Environmental Services Project
FLED	Forest for Local Economic Development
FPUA	Forest and Pastures Users Association
MoE	Ministry of Environment
NTFP	Non-Timber Forest Product
Sida	Swedish International Development Cooperation Agency
TAP	Trans-Atlantic Pipeline

## Table of contents

Executive summary .....	5
1.Introduction.....	10
2.Background information .....	10
Wood biomass as a source of renewable energy and low-carbon energy .....	11
Forest status in Albania .....	12
What is a value chain?.....	14
Methodology .....	14
3.Analysis of wood biomass value chains in four regions in Albania .....	15
Wood biomass value chain analysis: Policies .....	18
Wood biomass value chain analysis: Supporting organisations.....	22
Wood biomass value chain analysis: Fuelwood- Production, post-harvest care and processing.....	24
Wood biomass value chain analysis: Pellets- Production, post-harvest care and processing .....	26
Wood biomass value chain analysis: Marketing and trading .....	28
Wood biomass value chain analysis: Consumption .....	32
Wood biomass value chain analysis: Main conclusions .....	34
4.Approaches in support of wood biomass value chains .....	36
Enabling policy environment.....	36
Service delivery, cooperation and coordination .....	37
Forest management to increase production and productivity .....	38
Marketing and trade.....	40
Further research, studies and pilots.....	40
Annex 1: List of people and organisations met .....	42

## 1. Executive summary

Wood biomass is of great importance as source for heating and cooking in Albania and especially in rural Albania. This wood biomass value chain analysis study, commissioned by Connecting Natural Values and People (CNVP), aims to increase the understanding and to identify interventions in support of functional and equitable wood biomass value chains and effective and efficient use of wood biomass as a source of renewable and low carbon energy. Wood biomass includes a variety of products, such as: fuelwood, wood chips, scrap wood, brickets and pellets. This study focuses solely on fuelwood and pellets because of their relative importance in Albania.

The report consists of three parts. The first part provides the background information and gives information on the use of wood biomass as renewable and low carbon energy source, the forest status in Albania, the value chain concept and the used methodology. The second part describes the different aspects of the wood biomass value chain analysis: 1) Policies, 2) Supporting organisations, 3) Production, post-harvest care and processing, 4) Marketing and trading, and 5) Consumption. In part 3 of this report the approaches in support of wood biomass value chains are further described, these relate to: 1) Enabling policy environment, 2) Service delivery, cooperation and coordination, 3) Forest management to increase production and productivity, 4) Marketing and trade and 5) Further research, studies and pilots.

### Part 1: Background

- *Wood biomass as source of renewable and low carbon energy*

Wood biomass is both a source of renewable energy if derived from sustainable managed forests/ plantations and a low-carbon energy source compared to other sources of energy such as gas and oil. As such wood biomass can contribute to a sustainable supply of energy resource while reducing carbon emissions.

- *Forest status in Albania*

Over the last decades, forests in Albania have become degraded mainly because of unsustainable and often illegal logging operations but also due to forest fires. At present Albania has in total 1,052,252 ha of forest land, of which 379,396 ha high forest, 295,440 ha coppiced forest and 377,416 ha consisting of shrubs.

- *Value chain concept*

Value chains have three important elements: 1) the supply chain (the sequence of processes from inputs for a specific product to primary production, processing, marketing to final consumption), 2) the organizational arrangements that link and coordinate producers, processors, traders, wholesalers, and exporters of a specific product and 3) a knowledge/ policy system combining information, technology and skills to coordinate production and marketing, and achieve high quality products.

- *Methodology*

Field visits were conducted in four regions including: Diber, Korca, Shkoder and Kukës. In all of these regions semi-structured interviews were held with numerous actors and stakeholders in wood biomass value chains such as Municipalities, Administrative Units, Forest Inspectorate, Forest companies, Pellet companies, Forest Associations (regional & communal level), fuelwood traders, retailers and farmers. At the national level, meetings were organised with the Ministry of

Environment, National Agency of Natural Resource, Forest Faculty and the National Forest Association.

## Part 2: Wood biomass value chain analysis

The second part of the report describes the value chain analysis on the basis of the following components: 1) Policies, 2) Supporting organisations, 3) Production, post-harvest care and processing, 4) Marketing and 5) Consumption. Below is an extract of the main findings.

- *Policies*

The new forest policies and the recently installed Moratorium have a strong impact on the availability of fuelwood and wood biomass. Since the Moratorium is in place all logging is banned and only sanitary forest operations such as thinning based on operational forest plans is allowed for the fuelwood supply. Furthermore, municipalities bear the sole responsibility for meeting the fuelwood demands of their citizens and institutions. As a direct result of these policies, demands for fuelwood are much higher than the official available supply while wood and pellet companies face severe difficulties in accessing wood biomass.

- *Supporting organisations*

Municipalities haven't yet taken full ownership of their new role in forestry following the new forest legislation. They often lack the capacities and the funds to set up functional forest structures with qualified staff, infrastructure and required equipment and give low priority to forestry activities. Forest associations often do have a good understanding of the forest situation because of their local presence but their potential is not recognised by government institutions. The private sector has been severely impacted by the new forest legislation but they were not consulted during the decision-making process while they play an important role in the production of pellets which contribute to a more efficient use of wood biomass.

- *Production, collection, post-harvest care and processing*

The forests cannot meet the existing fuelwood needs according to the available forest management plans. Many management plans have expired or are about to expire and are primarily focused on timber production. There is land available for the establishment of plantations. The production of fuelwood in plantations is more cost-effective than the extraction of fuelwood from natural forests because the latter requires expensive forest management planning (and forest inventories) as well as the establishment of a forestry road network.

Also the demand for pellets exceeds the supply. Because of difficulties in accessing wood biomass, pellet factories produce far under their capacities. Also they cannot import sawdust from abroad because sawdust is considered industrial waste and therefore not permitted to be imported.

- *Marketing and trade*

The market demands for both fuelwood and pellets exceed the supply. There is a stable export of fuelwood (88,142m<sup>3</sup> which is 91% of all wood exports), while a small volume (3,705 m<sup>3</sup>) was imported in the year 2015 despite the poor condition of the forest. Fuelwood prices increased severely over the last few years from about 2,500- 3,000 ALL per stacked m<sup>3</sup> to 4,000 ALL per stacked m<sup>3</sup>. The marketing of fuelwood is said to be largely informal. Because of the large demand for fuelwood also timber is sold as fuelwood.

There is a large demand for pellets. Pellet companies export their pellets to countries such as Italy, Kosovo, Greece and Macedonia, sell it to traders or sell it directly to customers. Some pellet companies have annual contracts with institutions such as hospitals and schools with central heating systems and supply required equipment (such as pellet boiler and burner), pellets and provide required maintenance.

- *Consumption*

In general households living in rural areas use about 7 m<sup>3</sup> to 10 m<sup>3</sup> fuelwood per year while households in urban areas use about 4 m<sup>3</sup> to 5 m<sup>3</sup>. People prefer beech and oak wood to be used as fuelwood. There is an increasing demand for fuelwood efficient stoves and pellet stoves to reduce the dependency of wood and to increase the heating efficiency. Pellet stoves have a very high efficiency of up to 90% but one of the major drawbacks of a pellets stove is that it needs electricity to operate. Pellet stoves might thus not be that suitable in areas where there is no or no stable supply of electricity. The energy efficiency could also be increased through thermal insulation (energy savings of 40 to 50%).

### Part 3: Approaches in support of wood biomass value chains

This last part of the report describes a number of approaches and recommendations that can be implemented in support of wood biomass value chains. These include: 1) Enabling policy environment, 2) Service delivery, cooperation and coordination, 3) Forest management and production of wood biomass, 4) marketing and trade and 5) further research, studies and pilots.

#### *1. Enabling policy environment*

Related to the enabling policy environment the following is recommended:

Secured long-term access to fuelwood by traditional forest users: People who have long-term interests and directly benefit from forest resources are also the people who are most motivated to protect and manage the forest in a sustainable manner. Especially villagers who protected and managed their traditional forests have a good opportunity to produce wood biomass/ fuelwood in a sustainable way if they have secured user or property rights.

Secured long-term access to wood biomass by forest/ pellet companies: Also forest/ pellet companies are more inclined to invest and manage forests in a sustainable manner if they have long-term forest concessions/ or can lease degraded forest land/ abandoned land for the establishment of plantations of at least several (3-5) harvesting rotation cycles (for example 30 to 50 years).

Promotion of import and ban on export of wood biomass: A ban on the export of fuelwood may be appropriate because of the high internal demand for fuelwood. Also the government could negotiate agreements with neighbouring countries on affordable wood / sawdust imports.

Replacement of inefficient wood stoves by more efficient heating systems: Energy efficiency could be highly increased by replacing old wood stoves in institutions (government offices, schools, hospitals, etc.) with newer wood-efficient stoves and/ or install central heating systems based on fuelwood or pellets within the coming 5 years. Also the government could give financial incentives or fiscal benefits to promote the installation of improved wood or pellet stoves, central heating systems and/ or thermal insulation.

Support to Municipalities and the Forest Inspectorate: Municipalities and the Forest Inspectorate need to have sufficient funds and infrastructure to carry out their new roles and mandates in forestry.

## 2. *Service delivery, cooperation and coordination*

Recommendations:

Increased collaboration and coordination between ministries and municipalities: Better collaboration and coordination is required between different ministries, including the Ministry of Energy and Industry, the Ministry of Environment the Ministry of Agriculture, Rural Development and Water Management and Municipalities to implement the National Action Plan for Renewable Energy Resources (2015-2010). In the same line, ministries should work together and plan how to reduce the dependency on fuelwood and reduce the amounts of fuelwood used at both the national and municipality level.

Collaboration with Forest Associations: Forest Associations should play an important role in wood-biomass value chains because they have a good understanding of the forest situation and are locally present.

Meetings between pellet companies, Ministry of Environment and Municipalities: Pellet companies play an important role in making pellets locally available and are crucial in reducing the dependency on fuelwood because pellets can be made out of wood waste and pellets are more energy efficient. Meetings are important to assess the potential role of pellet companies in supplying pellets to institutions and future prospects on the role pellet companies could play in reducing the dependency and use of fuelwood.

Service delivery of Municipalities: Municipalities are expected to provide fuelwood to both citizens and institutions but most municipalities have not yet taken full ownership of this new role. Therefore, awareness raising of municipalities and support to municipalities are needed to make sure that municipalities fully understand their new mandates and can take up their new role.

## 3. *Forest management to increase production and productivity*

Recommendations:

Forest management planning: Forest management plans should be multi-objective and take into account fuelwood needs and not only focus on the production of timber. Annual operational plans might not be required for traditional forests, coppiced forest or shrub land for the production of fuelwood. Some technical directions could suffice for these areas, while an forestry expert of the Municipality could monitor if these directions are implemented.

Reinvestment of fees/ tariffs into forestry: Municipalities receive funds from gathered fees and tariffs related to forestry. These funds should be reinvested in forestry activities and not be used for paying salaries of forest experts. Salaries should be paid from the State budget.

Different models on increased fuelwood production: Five different models have been identified to increase the fuelwood supply, including: 1) Increased collaboration between municipalities and traditional forest users for fuelwood supply, 2) Management of oak coppice forest, 3) Management of shrub areas, 4) Plantations with fast growing species and 5) Agro-forestry models.

## 4. *Marketing and trade*

Recommendations:

Control of informal trade: It is also of importance to stop the informal trade from a marketing point of view. If the informal trade isn't stopped, forest companies following the legal procedures are disadvantaged because they have to pay taxes and higher prices for their wood, which distorts the



market. Of course the informal trade can only be stopped if there is sufficient and reasonable priced wood available on the formal market.

Market information: Market information is important especially related to the import of affordable wood materials to be used in pellet companies and about fuelwood since fuelwood has become scarce.

#### 5. *Further research, studies and pilots*

It is recommended to carry out further research, studies and/ or pilots on the following:

- Feasibility study and pilot on district heating
- Alternative sources of renewable energy such as the use of: geothermal energy, pelleting of agricultural waste (such as for example straw, stalks, reed, nutshells, and olive pomace), solar, wind or other renewable energy sources.
- Studies/ pilots on the above mentioned forest management models: 1) Establishment of collaboration between municipalities and traditional forest users in fuelwood supply, 2) Management of coppiced forest for fuelwood supply, 3) Management of shrub areas for the production of wood chips, 4) Establishment of plantations with fast growing species for fuelwood production and 5) Agro-forestry models.
- Identification of available/ suitable areas for the establishment of tree plantations with fast growing species for wood biomass production.
- Research on potential reductions in carbon emissions following strategies for reduced fuelwood dependency and increased energy efficiency.

## 2. Introduction

The project 'Forest for Local Economic Development (FLED)' (2014-2018) supported by the Swedish International Development Cooperation Agency (Sida) and implemented by Connecting Natural Values and People (CNVP) in collaboration with the Ministry of Environment (MoE), relates to a four year collaborative programme of communal forests and pastures capacity building and organisational strengthening.

The FLED project promotes improved decentralised decision making, planning and implementation of forests and pastures in support of more inclusive economic development. The project's main objective is: *Improved decentralised and sustainable Communal Forestry providing increased production, service and income to rural communities*. This will be achieved through the following 5 outcomes:

1. Improved decentralised Forest and Pastures area management and secured property/user rights in existing and new target communes;
2. Enhanced relevance and sustainability of Forest and Pastures Users Associations (FPUAs), Regional Federation of Forest and Pastures Users and National Federation of Forest and Pastures Users;
3. Forest and Non-Timber Forest Products (NTFP) value chains (further) developed and strengthened;
4. Strengthening multi-objectives forest management approaches (incl. wood biomass for renewable energy and carbon sequestration) and increase understanding and acceptance to stakeholders, in particular of policy makers and regulators
5. Strengthening the institutional, policy & legal framework for forestry with special attention to governance principles such as: accountability, transparency, rule of law and participation/social inclusion

As part of the activities under outcome four, the FLED project commissioned this study on wood biomass analysis. Wood biomass is the major energy source for heating, especially in rural areas where there is little/ no access to alternative energy resources. This value chain analysis study is conducted to get a better understanding of the functioning of the existing wood biomass energy value chains and focuses on fuelwood and pellets. The study also identified entry points for interventions to make the chain more equitable and sustainable.

### **Purpose**

The purpose of this wood biomass analysis value chain study is:

To carry out an analysis of the wood biomass value chain in Albania and to identify interventions that CNVP and others can implement in support of functional and equitable wood biomass value chains and effective and efficient use of wood biomass as a source of renewable energy.

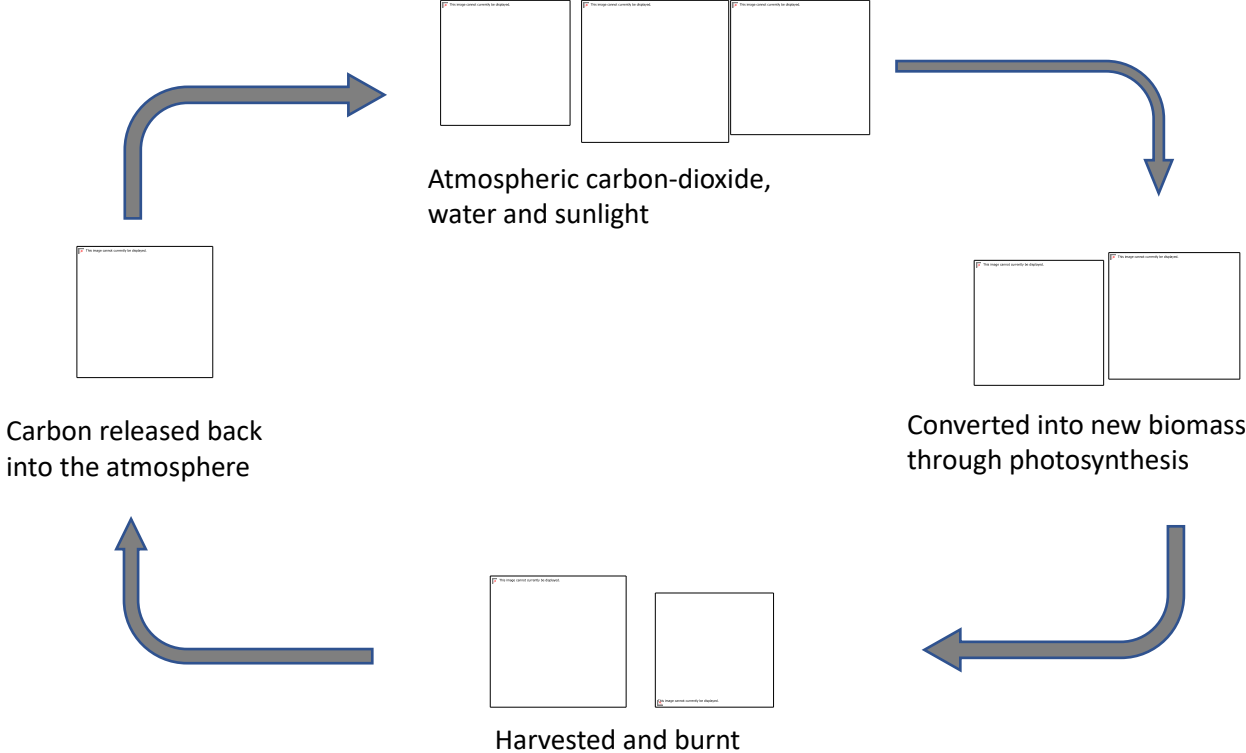
Wood biomass includes a variety of products, such as: fuelwood, wood chips, scrap wood, brickets and pellets. This study focuses solely on fuelwood and pellets because of their importance in Albania.

## 3. Background information

In this chapter some background on this study is given and includes information on wood biomass as a source of renewable energy and low-carbon energy, the forest status in Albania, what is understood by a value chain in this study and the methodology used.

**Wood biomass as a source of renewable energy and low-carbon energy**

Wood biomass is a source of renewable energy. Through photosynthesis plants can absorb the energy of the sun: water + carbon dioxide + sunlight → glucose + oxygen (6 H<sub>2</sub>O + 6 CO<sub>2</sub> + sunlight → C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> + 6O<sub>2</sub>) and grow. If forest are managed sustainably, meaning not more is taken out of the forest than the increment, forest can provide energy in the form of wood biomass in perpetuity, see figure 1 below.



**Figure 1: Typical biomass carbon cycle**

In contrast energy sources such as gas, oil or coal are not renewable. When these fossil fuels are combusted, they release CO<sub>2</sub> that was captured by photosynthesis millions of years ago. It is the release of this ‘fossil’ CO<sub>2</sub> that is the major contributor to global climate change. Although the CO<sub>2</sub> resulting from the combustion of biomass can be recaptured by the new growth of plants (biomass), some net emissions still result from the cultivation, harvesting, processing and transportation of the wood biomass, and the manufacture and operation of the necessary equipment (for example wood processing and pellet plants). These processes consume fossil fuels and thus lead to some CO<sub>2</sub> emissions.

Apart from being renewable, wood biomass is also a low carbon energy source. Table 1 shows the typical ranges of carbon emissions per unit of power which are achieved for biomass when used for heating and electricity conversion, relative to conventional fuels. These figures include raw material supply, production, transport, energy generation and eventual disposal. Although the figures are derived from the United Kingdom, they can be representative for other countries as well.

**Table 1: Lifecycle CO2 emissions comparison**

Electricity generation	kg CO2/MWh
Wind	6.9-14.5
Biomass	15-49
Natural gas	369-398
Space heating	kg CO2/MWh
Biomass (woodchip)	10-23
Natural gas	263-302
Oil	338-369

(Carbon Trust, 2008)<sup>1</sup>

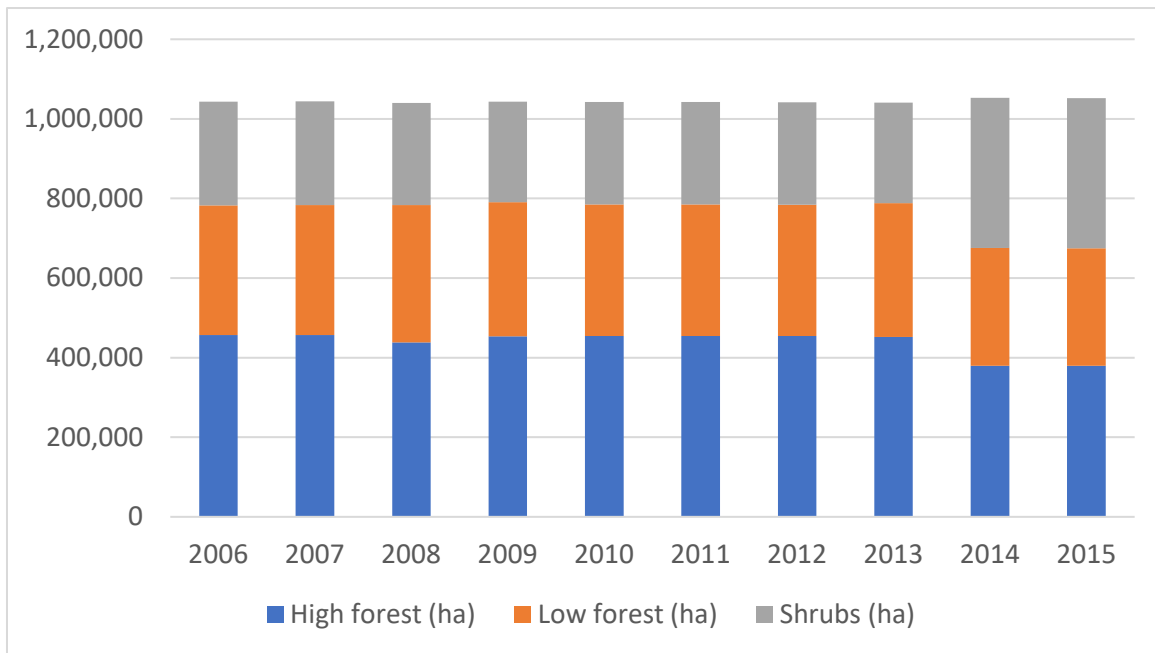
## Forest status in Albania

Albania has a total area of 1,052,252 ha of forest land, of which 379,396 ha of high forest, 295,440 ha coppiced forest and 377,416 ha consisting of shrubs, according to the data of 2015 from the Ministry of Environment. During the last 25-30 years the forest has been severely degraded mainly because of unsustainable and often illegal logging operations but also due to forest fires. Especially during the period of 2007-2012, it was estimated that about 150,000 ha of forest were destroyed/damaged because of forest fires.

Also official figures from the Ministry of Environment show clearly a decline in high forest areas and decrease in forest volumes. The area of high forest sharply declined while the area of shrubland increased in 2014. The volume figures show a similar pattern with See figure 2 on the areas of high forest, low forest and shrub land and figure 3 on the volumes of these forest categories over the period 2006-2015.

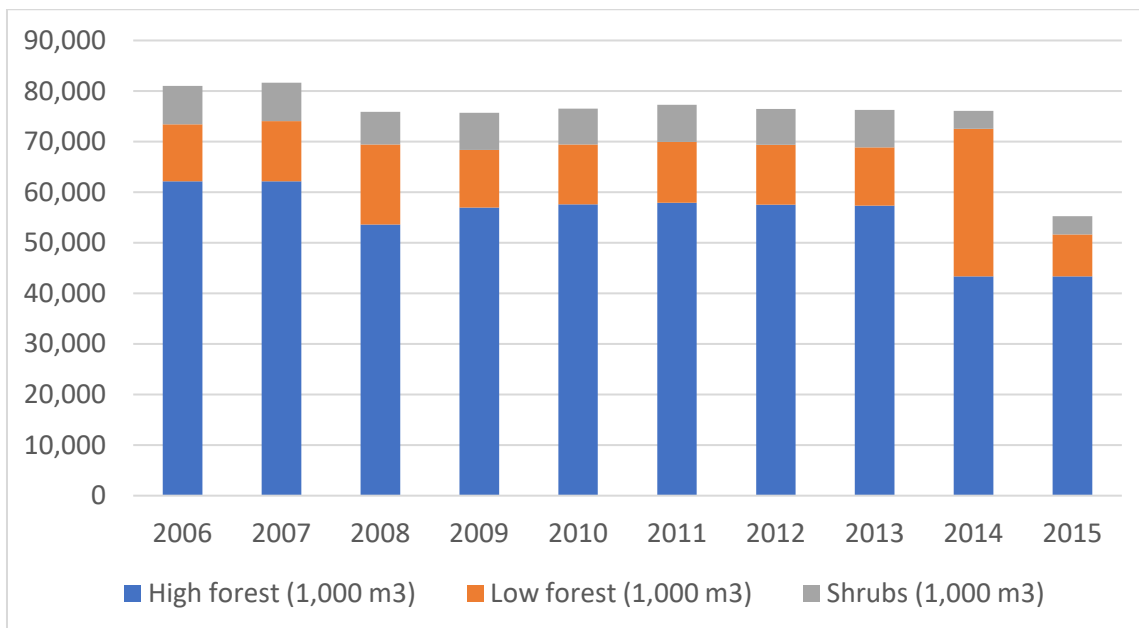
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<sup>1</sup> Carbon Trust, 2008. Biomass heating: A practical guide for potential users. In-depth guide CTG012. Available at: [https://www.carbontrust.com/media/31667/ctg012\\_biomass\\_heating.pdf](https://www.carbontrust.com/media/31667/ctg012_biomass_heating.pdf)



Source: Ministry of Environment<sup>2</sup>

**Figure 2: Trends in high forest, low forest and shrubs areas (ha)**



Source: Ministry of Environment<sup>3</sup>

**Figure 3: Trends in high forest, low forest and shrubs areas (ha)**

<sup>2</sup> Data are derived from: <http://www.instat.gov.al/al/themes/mjedisi.aspx?tab=tabs-5>

<sup>3</sup> Data are derived from: <http://www.instat.gov.al/al/themes/mjedisi.aspx?tab=tabs-5>

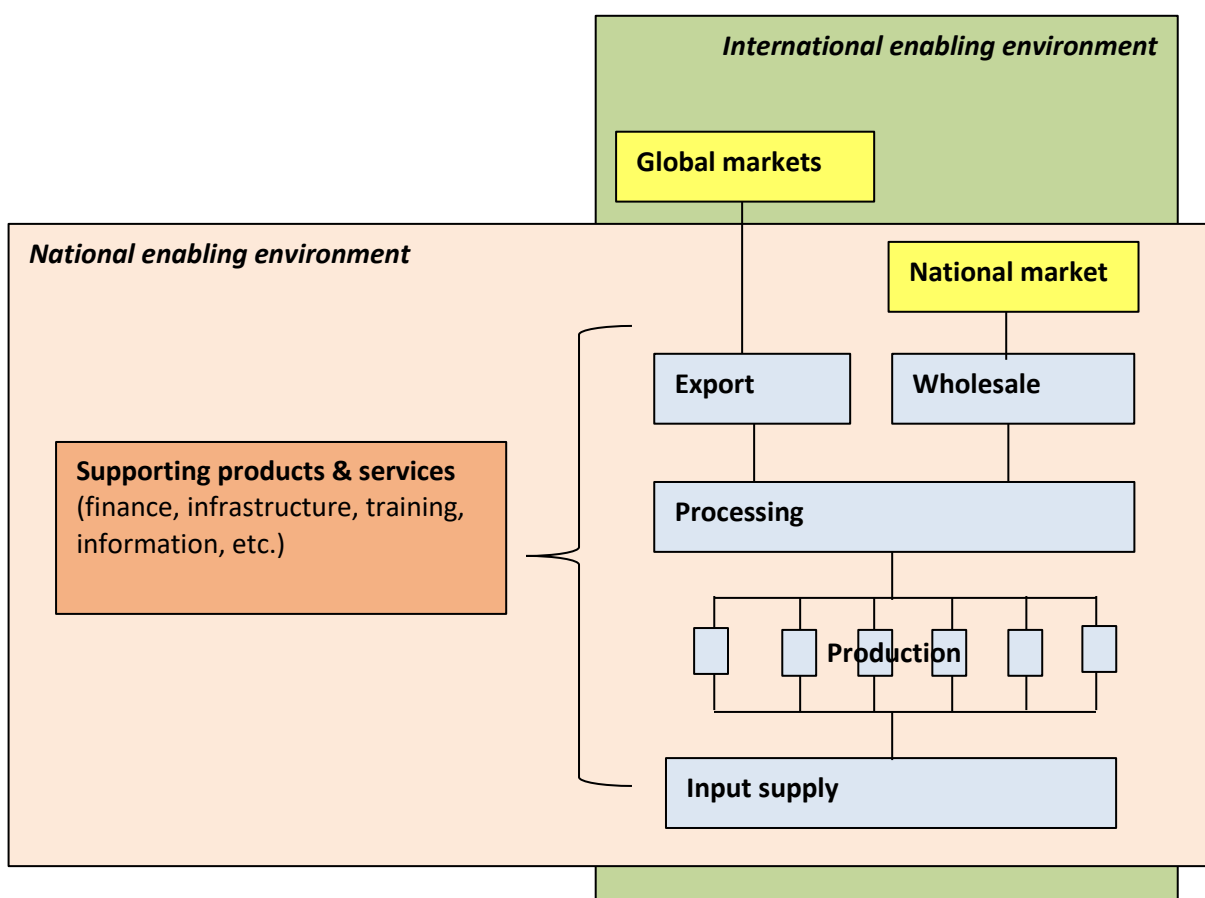
## What is a value chain?

This study uses the following definition of a value chain:

A value chain is:

- The sequence of processes from inputs for a specific product or service to primary production, processing, marketing to final consumption (supply chain);
- An organizational arrangement that links and coordinates producers, processors, traders, wholesalers, and exporters of a specific product or service;
- A knowledge system combining information, technology and skills to coordinate production and marketing, and achieve high quality of products and services

This definition of a value chain can be pictured as provided in figure 4 below.



**Figure 4: Schematic overview of a value chain lens**

## Methodology

The methodology used for this study includes field visits to four of the nine regions where CNVP implements the FLED project. These four regions include: Diber, Korca, Shkoder and Kukes. In all of these regions semi-structured interviews were held with numerous actors and stakeholders in wood biomass value chains including: at Municipalities, Administrative Units, Forest Inspectorate, Forest

companies, Pellet companies, Forest Associations (regional & communal level), fuelwood traders, retailers and farmers.

At the national level, meetings were organised with the Ministry of Environment, National Agency of Natural Resource, Forest Faculty and the National Forest Association. The preliminary findings were discussed within the CNVP team, while the final findings of the value chain analysis were presented in a national workshop (see Annex 1 for further details about the stakeholder meetings).

The study made use of the value chain lens as depicted in the above-mentioned figure 4 to analyse the fuel wood and pellet value chains. The analysis is carried out and describes the value chains on the basis of the following components: 1) Policies, 2) Supporting organisations, 3) Production, post-harvest care and processing, 4) Marketing and 5) Consumption.

## 4. Analysis of wood biomass value chains in four regions in Albania

### Main stakeholders

Below are the main stakeholders and their key roles in the wood biomass value chain listed:

- Ministry of Energy and Industry
  - Responsible for the development of energy sector
  - New Renewable Energy Law just approved by the Parliament
  - National Action Plan for Renewable Energy Resources (2015-2020)
- Ministry of Environment
  - Responsible for the sustainable management and development of the forestry sector
  - Number of new policies and decisions in place: E.g No 5, Feb 4, 2016 (Moratorium), No 438 Jun 8, 2016, No 808 Dec 12, 2016
- Municipalities
  - Responsible for fuelwood supply to citizens and institutions within municipality
- Forest Inspectorate
  - Monitoring of forest and environment: checking if regulations are followed
- Forest user associations:
  - Awareness raising
  - Support municipalities in developing annual utilisation plans
  - Training in proper forest management: especially thinning and cleaning
  - Representation of interest of forest users

- Environmental Services Project (ESP)

The aim of ESP, a project of the World Bank, is to support sustainable land management practices and increase communities' monetary and non-monetary benefits in targeted erosion prone rural upland areas. In relation to wood biomass, ESP plays or will play an important role in:

- Preparation of communal micro-catchment plans (CMCPs) and upgrading of communal forest and pasture management plans into CMCPs
- Provision of grants for forest management as for example for the establishment of small plantations, thinning operations and other forest sanitary activities

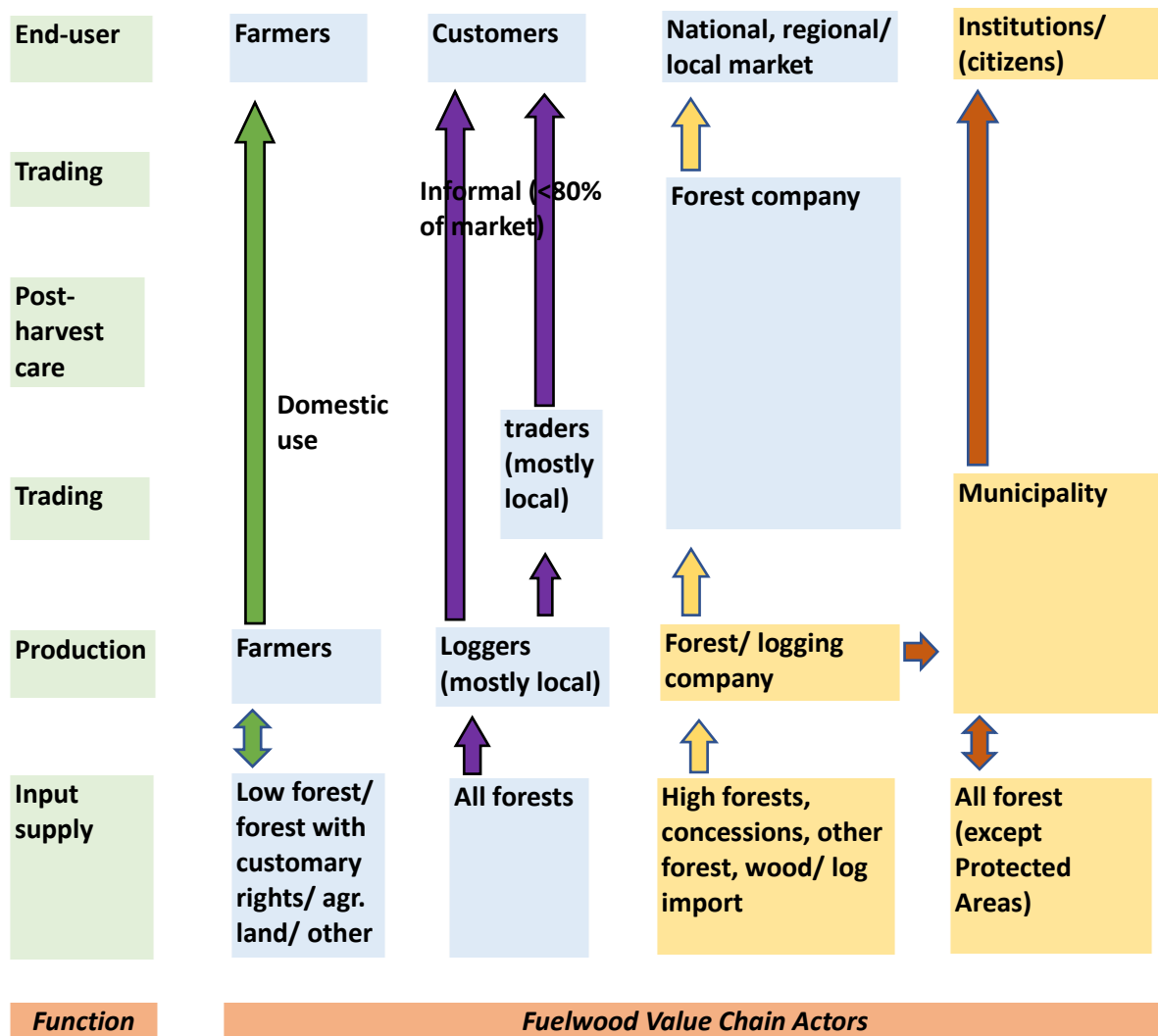
- Logging companies/ wood processing companies
  - Production of fuelwood and pellets
  - Note difference between 1 m<sup>3</sup> fuelwood and 1 m<sup>3</sup> stacked fuelwood (1.6 : 1)
- Traders and wholesalers
  - Buying, transporting and selling of fuelwood
  - This role is expected to be taken over by municipalities from 2017 onwards
- Consumers
  - Users of fuelwood and pellets: Households, private companies (hotels & restaurants), schools, hospitals, and others

## Fuelwood actors and their function in the value chain

There are different fuelwood value chains:

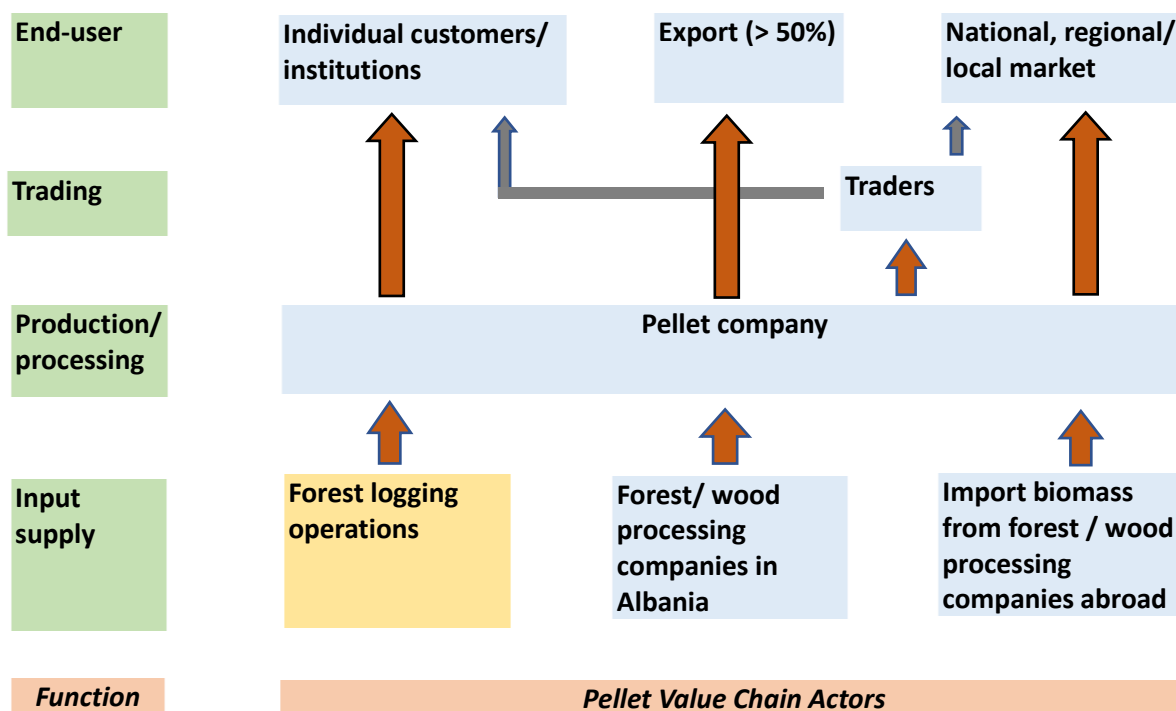
- 1) **Domestic use fuelwood chain:** The most simple chain starts with farmers collecting fuelwood from their land (for example from their traditional/ customary forest land or agricultural land) or from land belonging to the municipality or state. In general they collect mostly fuelwood from low forest near their homes. They chop and dry the wood themselves and use the wood for their own needs. This chain is depicted by the green arrows in figure 5 below.
- 2) **Informal fuelwood chain:** Although informal, this is considered the most common value chain: Loggers take fuelwood from all kind of forests (without taking care of the forest resources) and sell it to traders or bring it directly to customers' homes. Customers make appointments with loggers who'll bring the fuelwood in a truck load to their homes (the fuelwood is often brought in the early morning hours around 4:00 a.m. to avoid checks by the Forest Inspectorate). It is estimated that about 80% of the fuelwood supply takes/ took place in this way. This chain is depicted by the arrows in purple in figure 5.
- 3) **The forest company fuelwood chain:** Logging is carried out by the forest/ logging company based on a contract with the State/ Municipality. This contract states where the company can harvest the wood, how much, and the techniques that should be applied. The forest company buys the wood from the logging company (in many cases the logging company is part of the forest company) and sells the fuelwood on the local, regional or national market. According to the new forest policies and Moratorium, forest companies will not be allowed to transport and market fuelwood from 2017 onwards unless they have imported the wood (yellow arrows in figure 5).
- 4) **The municipality fuelwood chain:** According to the new forest policies, which will be described in more detail in the next chapter, the municipalities are solely responsible for the fuelwood supply to their citizens and institutions within their area of jurisdiction. They have two options either 1) to set up a new structure to harvest, transport and sell fuelwood themselves or to contract a logging company to do the logging. The logging company has to leave the logs at the roadhead while the municipality is responsible for the transport and marketing of the fuelwood. This chain has not yet been practised but is expected to become the main chain from 2017 onwards (depicted by the yellow arrows in figure 5).





**Figure 5: Fuelwood value chain actors and their functions**

The pellet value chain concentrates on the pellet companies. Most of the companies get their wood biomass for their pellets from wood waste from wood processing companies. In many cases, companies extended their wood-processing company with a pellet plant to make use of this waste and turn it into a sellable product. Also some materials for making pellets are imported. With the new laws in place forest logging will no longer be allowed. The companies often sell the pellets directly to their customers in Albania or export their products to for example Italy, Greece, Macedonia and Kosovo. Some pellet companies have annual contracts with institutions such as schools and hospitals with central heating systems to supply pellets, equipment and provide maintenance. See figure 6.



**Figure 6: Pellet value chain actors and their functions**

## Wood biomass value chain analysis: Policies

At present the percentage of the consumption of renewable energy is about 31% in Albania and the target set for 2020 is 38%. This is far above the the EU's Renewable Energy Directive binding target of 20% final energy consumption from renewable sources by 2020.

There are a number of policies, rules, regulations and action plans that are relevant to the wood biomass value chains from both the Ministry of Energy and Industry and the Ministry of Environment.

In February 2017, the Parliament of Albania passed the Law on “Promotion of the Use of Energy from Renewable Sources”. However, this new law doesn't pay much attention to the use of wood biomass and pellets as a source of renewable energy but focuses on support mechanisms for producers of renewable energy such as hydropower installations.

Wood biomass as a source of renewable energy is mentioned in the National Action Plan for Renewable Energy Resources (2015-2020). This plan foresees the following sources of renewable energy for reaching the set target of 38% by 2020:

- Hydropower, wind energy, solar energy: 25%
- Biomass: 10%
- Biofuels: 3%

Although a contribution of biomass of 10% is mentioned to reach the overall renewable energy target, a maximum share of wood biomass is mentioned of about 1%. See table 2. The plan foresees a reduction of wood fuel consumption from 211,50 ktoe in 2013 to 167,79 ktoe in 2020 and the need to do re-afforestation of at least 2200 ha annually.

**Table 2: Theoretical potential of biomass to contribute to the renewable energy balance<sup>4</sup>**

<b>Biomass source</b>	<b>Percentage to contribute to the renewable energy balance</b>
Forests	1.07%
Biomass from seed/ fruits/agricultural production	4.45%
Urban waste	5.80%
Waste from fruit trees	0.65%
Cattle waste	2.37%
Power plants	0.26%
<b>Total</b>	<b>14.6%</b>

Another important law is the Law on integrated waste management. This law states that the import of industrial waste is not permitted. As a consequence of this law, sawdust coming from wood processing companies abroad is considered as industrial waste and thus not allowed to be imported by companies in Albania for further processing into pellets.

Since last year a number of new policies and decisions are in place with the aim to stop the further degradation of the Albanian forests. The government installed a Moratorium (Decision No 5, Feb 4, 2016) stating that it is not permitted to harvest any wood for any purpose from any land, with a few exceptions: a) Harvesting of fuelwood for the needs of inhabitants in municipalities, b) Change of land use and c) Sanitary forest activities needed for forest regeneration. Decisions No 438 Jun 8, 2016 and No 808 Dec 12, 2016 mention that solely municipalities will be responsible for the fuelwood supply for heating for citizens and institutions within their area of jurisdiction and describe the processes that need to be followed. Municipalities are given two options:

1. Set up their own structure and implement all activities from fuelwood collection to marketing
2. Contract (using a tender process) a forest company to do thinning and cleaning operations. The contracted forest companies must leave the extracted fuelwood at the road head, while solely the municipalities are responsible for transport and marketing.

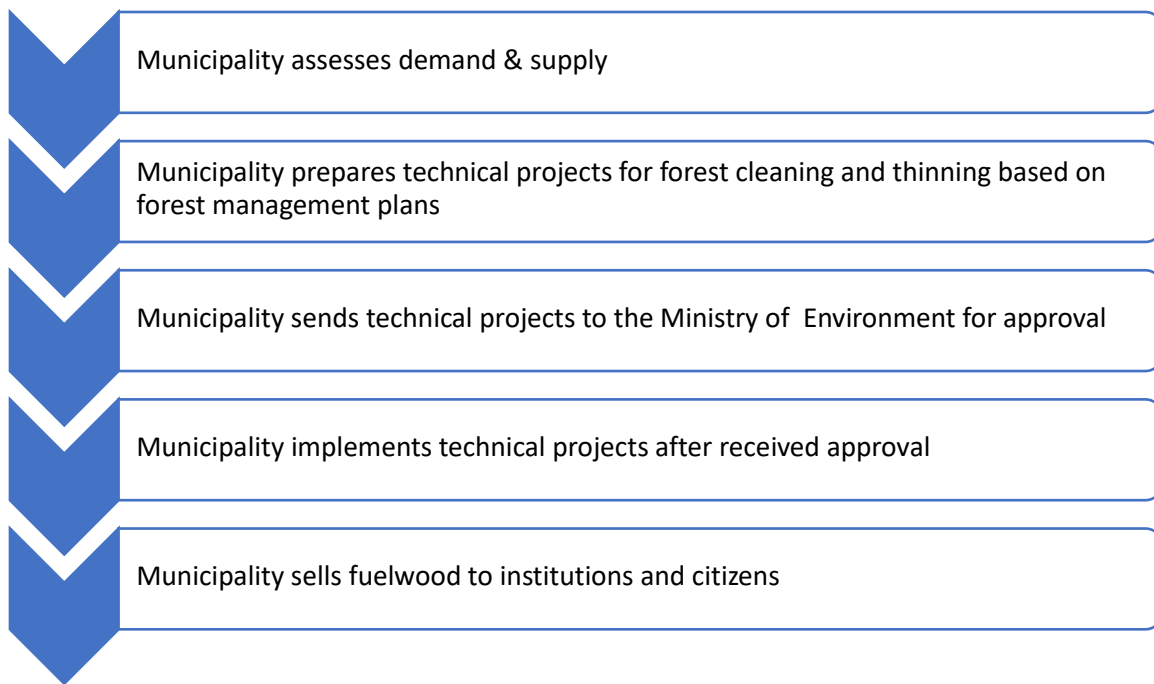
People who operate on the wrong side of the law can be fined five million ALL. It is however very difficult to collect such amounts from trespassers.

The process that should be followed is depicted in figure 7. The new regulations came into effect on the first of January 2017.

Demands on wood in neighbouring countries increased because of the Moratorium on wood logging in Albania. The country of Montenegro responded swiftly with a log export ban which is effective since January 2017 and only permits the export of processed wood.

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<sup>4</sup> National Action Plan for Renewable Energy Resources (2015-2020) in Albania. Ministry of Energy and Industry. Available at: [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/4076384/2E8C39A260DC7B48E053C92FA8C058E3.pdf](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4076384/2E8C39A260DC7B48E053C92FA8C058E3.pdf)



**Figure 7: Foreseen process of fuelwood supply according to the new regulations**

At present, municipalities face a number problems to fulfil this new mandate of supplying fuelwood from forest cleaning operations to citizens and institutions within their area following the intended process, such as:

Assessment of fuelwood demand and supply: Many municipalities found out that the demand for fuelwood is much higher than can be supplied through forest cleaning operations. For example Pogradec municipality assessed a fuelwood demand of 60,000 m<sup>3</sup> and a supply of 3,000 m<sup>3</sup>; Diber municipality mentioned similar figures: a need for fuelwood of 60,000 m<sup>3</sup> and a supply of 2,500 m<sup>3</sup>. In Shkoder municipality a demand of 160,000m<sup>3</sup> versus a supply of 7,000 m<sup>3</sup> was mentioned. Another issue is that the supply need to be assessed based on forest management plans. However, most State Forest management plans expired since 2013 while Communal Forest and Pastures management plans just expired or will expire in the coming one to three years. Also there are some forest areas that were not covered by the recent management plans and rely on forest management plans of the period 1981-1991. In case forest management plans were lacking, the government allowed municipalities to make partial assessment of some forest parcels. It was mentioned that this would only be allowed in 2016 but this decision has been extended to 2017.

Preparation of technical projects for forest cleaning and thinning: The technical projects that are prepared are often based on insufficient information because forest management plans are expired or not reflecting reality. Also technical project may only be prepared for small areas based on the partial assessments.

Approval by Ministry of Environment. Only projects that are based on management plans / field assessments will be approved.

Implementation of technical projects: In general municipalities lack the capacities and funds related to forestry and for implementation of the technical projects, such as required for: Forest management planning, forest operations, marketing forest products, etc.

Sale of fuelwood to institutions and citizens: As a consequence of the previous steps and the forest condition in Albania, the demand for fuelwood is much higher than the legal and sustainable supply.

Municipalities focus on the supply of fuelwood to institutions and often let citizens find their fuelwood on the informal market.

Some people believe that the new policies will even create an increased forest degradation because they expect an increase of informal collection of fuelwood while there is a lack of funds and other resources for the Forest Inspectorate to control illegal wood extraction. Others believe that the forest status will improve because it will become easier to control illegal timber exploitation because all logging has become illegal. It is also expected that the new policies will lead to more economical use of fuelwood, use of agricultural waste for heating and use of more efficient wood or pellet stoves because of the increasing market price of fuelwood. Also people will be more aware of the value of forests and the importance of sustainable management of forest resources. People, especially in cities and towns might shift from using fuelwood and use gas, oil or electricity as energy source for heating. Gas is in general only available in cities and not in the smaller villages. Alternatives for fuelwood use in remote area are in fact not possible under the present conditions. Although an increased use of this kind of energy sources might be good in terms of reducing the pressure on the forest resources, these are non-renewable and high-carbon sources of energy and should not be promoted. It is therefore recommended to establish incentive schemes for the use of improved wood/ pellet stoves and central heating systems that are more effective and efficient.

In general forests are best managed by people/ organisations who have a stake and directly benefit from the forest resources because it is in their own interest if forest lands are properly managed. People are willing to invest time and resources in forest management if they know they'll reap the future benefits. If people are not benefiting from the forests or if procedures are too cumbersome, people will in general be demotivated and not interested in protecting and conserving forest resources. Policies should therefore be conducive and facilitate long-term tenure arrangements to people/ organisations based on strict criteria to ensure proper and sustainable management of the forest resources. A start has been made with the decentralization of forest land from the State to the former communes and from the former communes to individual households based on traditional rights, participatory mapping and participatory demarcation processes. Since the former communes no longer exist because of the Administrative Reform, forest land ownership needs to be transferred and registered from the former communes to the municipalities and from the municipalities to the individual households residing in forest areas. This is not as easy as it sounds because aggregated forest data at the municipality level are often lacking. Funds are available from the Environmental Support Project to support this process and register forest land in the name of the municipalities. Apart from providing long-term user rights or even property rights to individual households, also long-term forest concessions or forest land lease for at least three rotations to logging/ wood processing/ pellet companies could be considered. Funds from the Environmental Support Project are also available to support and finance forest management planning at a national scale.

Wood extraction of any kind is not permitted in protected areas. However, some villages are residing in protected areas and farmer families take care and make use of their customary forests. With the new regulations it is unclear how people can still access their forests and extract fuelwood from thinning and sanitary forest activities year after year.

The new forest policies also seriously affect wood-processing and pellet companies because they lack access to wood materials, logs and/ or sawdust. Companies expressed feelings of disillusion because they were not heard in the preparation of the revised forest policies while their business is seriously impacted. The turnover of some of these companies is over a million Euro per year and one company recently invested over two million Euro in his wood processing and pellet company. Wood-processing and pellet companies in Shkoder consider closing or moving to Montenegro since they no longer can import raw materials from Montenegro because of the ban on exporting logs. This will lead to a loss of employment opportunities in the area and reduced income for the state. As one company owner expressed: "If our government doesn't like our taxes, we will pay them somewhere else".

It is important to find solutions for the wood processing and pellet companies and ensure access to affordable raw materials. The government could for example try and make agreements with

neighbouring countries on wood imports and/ or allow the import of saw dust. Saw dust could also be regarded as a resource instead of as industrial waste. Also, there is a need for proper communication between the affected private companies and the state.

The above-mentioned challenges and opportunities in the text are summarised in table 3.

**Table 3: Challenges and opportunities in the policy environment**

Challenges	Opportunities
<ul style="list-style-type: none"> <li>• Decrease of forest status because of an increase of informal collection of fuelwood and lack of capacities/ funds of forest institutions to control</li> <li>• Use of high carbon energy sources as alternatives (gas, oil, electricity)</li> <li>• Supply of (fuel)wood/ sawdust uncertain</li> <li>• Demotivation of farmers taking care of their customary forests</li> <li>• Fuelwood supply to villages located inside protected areas unclear</li> <li>• Fines of 5,000,000 are too high and payment cannot be enforced</li> <li>• Lack of aggregated data since Administration Reform</li> <li>• Registration of forest land and recognition of forest use certificates</li> <li>• Demotivation of private sector (not heard in decision making processes)</li> <li>• Wood processing plants lack access to materials</li> <li>• Wood processing plants considering closing or moving abroad</li> <li>• Reduced job and employment in logging/ wood processing companies</li> <li>• Reduced income for the state (taxes)</li> </ul>	<ul style="list-style-type: none"> <li>• Forest status will improve because easier to control timber exploitation (all timber exploitation is illegal)</li> <li>• More economical use of fuelwood</li> <li>• Use of agricultural waste for heating</li> <li>• Use of more efficient stoves (improved stoves/ pellets)</li> <li>• More awareness about importance of forests</li> <li>• Funds available from the Environmental Support Project to finance registration process and forest management planning</li> <li>• Further decentralisation of forest land to farmers (property rights/ user rights)</li> <li>• Long-term concessions and/ or leasing of forest land to wood processing/ pellet companies</li> <li>• State to make agreements with neighbouring countries on wood imports</li> <li>• Regard sawdust as resource instead of industrial waste</li> <li>• State to set up incentive schemes for the use of improved (pellet) stoves/ central heating systems.</li> </ul>

**Wood biomass value chain analysis: Supporting organisations**

The organisations involved and their roles in wood biomass value chains have already been described in a previous chapter. Although roles and mandates of the different organisations might be clear on paper, in reality there is some confusion on roles and responsibilities of the different actors. At present municipalities are regarded as the forest owner and solely responsible for forest management since the new forest policies came into place in 2016. Following the new policies, several municipalities have been able to set up new structures for forest management to fulfil its new role and mandate, while no such new structures do exist yet in some other municipalities. Some of the forest structures do exist but don't even have an office or computer. Overall, municipalities lack capacities, experience and funds in proper forest management including: Forest management planning, forest operations, marketing forest products, etc. Also municipalities are not yet used to allocate sufficient funds to forestry and agriculture. For example less than 5% of the investment budget is allocated to agriculture and forestry in Shkoder municipality. It is important that

municipalities better recognise their role and mandate in forestry and take proper ownership of this new role. Also roles of different actors might need to be further clarified.

The newly established Forest Inspectorate also lacks capacities and funds to properly control and monitor the forests. In many municipalities, the Forest Inspectorate doesn't have uniforms, nor vehicles and other equipment. Manpower is also limited with for example only 13 people at the Forest Inspectorate of Kukes region to monitor 156,000 ha of forests and pastures. People at the Forest Inspectorate say that they do their best to do their jobs to the best of their abilities. They know the hot spots of illegal activities and often make use of their own vehicles to monitor the forests in these areas. It is expected that uniforms, equipment and vehicles will become available to the Forest Inspectorate in the near future.

As already mentioned in the chapter on policies, there is a need to increase the mutual understanding between the private wood processing / pellet companies and the involved Ministries. Companies expressed that they do not expect that the government will find immediate solutions but they would like to be heard. As one of the forest company owners expressed: "I declare 3,000,000 Euro turnover per year, but I am never invited to the meetings where the decisions are made".

The function and role that forest associations can potentially play in forest management is at present not recognised. Forest user associations are established through a democratically election process and represent the forest users at all levels. Municipalities could make better use of the forest associations because they have local presence and have a good understanding of the forest situation. Forest users could play a role in awareness raising, assessing fuelwood needs, development of annual utilisation plans, training in forest management and decentralisation of forest lands to households with customary rights over these rights and in other relevant topics.

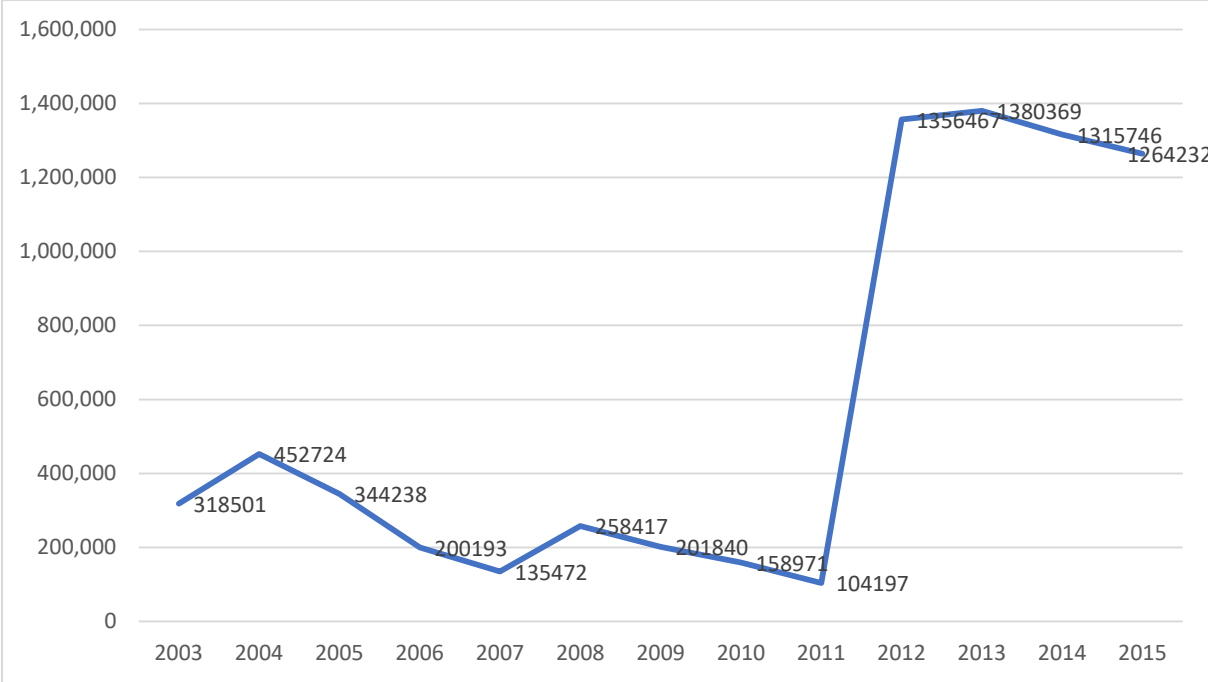
Table 4 provides an overview of the challenges and opportunities related to organisations in the wood value chains.

**Table 4: Challenges and opportunities related to organisations**

Challenges	Opportunities
<ul style="list-style-type: none"> <li>• Confusion on roles and responsibilities of different actors</li> <li>• Private sector not heard by ministries</li> <li>• Municipalities lack capacities/ funds in proper forestry : Forest management planning, forest operations, marketing forest products, etc.</li> <li>• Forestry given low priority by municipalities (e.g. only 5% of investment budget allocated to agr/ forestry in Shkoder municipality)</li> <li>• Forest Inspectorate lack capacities to control and monitor (e.g. 13 people at Kukes Forest Inspectorate to monitor 156,000 ha of forests and pastures)</li> <li>• Demotivation of forest associations as their roles/ potentials are not recognised</li> </ul>	<ul style="list-style-type: none"> <li>• Organisation of meetings/ discussions between private sector and ministries</li> <li>• Organisation of meetings/ discussions to clarify roles</li> <li>• Municipalities to take ownership of forest resources</li> <li>• Forest associations can play a role in assessment of fuelwood needs, available resources (traditional forest) and supply to municipalities</li> </ul>

### Wood biomass value chain analysis: Fuelwood- Production, post-harvest care and processing

The Ministry of Environment collects data on the production and use of fuelwood, see figure 8. These figures show a sharp increase from 104,197 m<sup>3</sup> in 2011 to 1,356,467 m<sup>3</sup> in 2012. It is more likely that this increase is due to a better recording of data than that there is a tenfold increase in fuelwood production and use in reality. The actual figures might be higher because of informal fuelwood collection. It is very important to have access to reliable fuelwood data for informed decision-making processes. If data are unreliable or incomplete, decisions are made based on the wrong understanding and might have negative unforeseen consequences.



**Figure 8: Fuelwood production and use in Albania in m<sup>3</sup>**

The basis for fuelwood production are the annual forest operational plans which are derived from forest management plans. Management plans for State forests were developed in 2003/ 2004, while management plans for the communal forest areas were developed in the period of 2006 to 2010. These plans cover almost all the territory of Albania. Some pockets of the country were not covered by these last planning cycles but still are covered by forest management plans for the period 1981-1991. In general the forest management plans focus on timber productions rather than fuelwood supply. Trees/ logs with a diameter of 4 to 8 cm are officially considered as firewood. Trees with a DBH of more than 8 cm are regarded as timber and lower than 4 cm is biomass. Forest management operations might differ from a timber production or fuelwood production viewpoint. For example, coppiced oak forests are not of interest for timber production but could provide a sustainable source of fuelwood supply if properly managed.

In most cases the status of the forest is different from the status described in the forest management plans and forests have become degraded and cannot fulfil current fuelwood demands. It is said that especially State Forests have become degraded due to forest fires, poor management, protection and control. Hopefully these forests will regenerate now the moratorium is in place. In contrast,

<sup>5</sup> Data available at: <http://www.instat.gov.al/al/themes/mjedisi.aspx?tab=tabs-5>



forests that are taken care of by farmers following traditional rights have regenerated and are in better condition than before. Farmers with traditional forest can do thinning and sanitary activities in their forest for their fuelwood supply if they have a permit. They have to pay about 500 ALL/ m<sup>3</sup> depending on the municipality and administrative unit. Local people can also obtain a permit from the Administrative Unit for fuelwood collection (through thinning and sanitary forest activities) in communal forests if it fits within the annual forest operational plan for the same price. People have to take care of the collection and transportation in that case by themselves.

Until 2016 Municipalities/ former communes contracted forest companies to do the logging, transport and sale of fuelwood. Forest concessions were mostly given for a time period of 10 years. At present, due to the new regulations, municipalities are in the process to set up their own structures to take over this role. It is said that the forest companies leave about 30% of the biomass in the forest after cleaning and thinning operations. In case of informal fuelwood extraction even 50% of the biomass such as branches is said to be left in the forest. Also the forest is said to be more damaged in case of informal logging because people take less care about the damage that occurs to the other standing trees and plants. Moreover, trees that could provide good timber are also extracted for fuelwood purposes.

Fuelwood extraction and prior to 2016 logging operations take mostly place in remote natural forests in mountainous areas. The sustainable management and use of wood is therefore very expensive as it requires amongst others careful forest management planning including costly forest inventories and the establishment of forest roads. Forest roads are at present in very poor condition and only certain kind of small trucks can drive over these degraded roads augmenting to the transportation costs. Furthermore, wood biomass can be available in some forest parcels which are not accessible because of the terrain. The establishment of tree plantations for fuelwood production on degraded and abandoned land would be much more cost effective.

Migration is another issue. Some forest areas need sanitary interventions but there is no labour available to carry out the heavy work because the youth has migrated elsewhere to look for better employment opportunities.

Freshly cut firewood has a high moisture content of about 50% to 60%, therefore it is important to leave the fuelwood to dry in a covered place for a period of at least six months. In six months-time the moisture content will be halved. Sometimes a piece of plastic is used to cover fuelwood to dry but this can be humid and is less efficient. The extraction of fuelwood should thus take place in springtime to allow sufficient time for the fuelwood to dry before the cold winter period starts.

The challenges and opportunities in fuelwood production, collection and post-harvest care are summarised in table 5.

**Table 5: Challenges and opportunities in fuelwood production, collection and post-harvest care**

Constraints	Opportunities
<ul style="list-style-type: none"> <li>• Forests cannot provide current fuelwood needs</li> <li>• Management plans expired or about to expire</li> <li>• Management plans have a focus on timber production</li> <li>• Poor condition of forest roads</li> <li>• Some forest parcels have wood biomass for extraction but not accessible</li> <li>• Lack of available labour to carry out sanitary activities in forests</li> <li>• Current process of fuelwood extraction in natural forests very expensive (forest management planning, including inventories, forest roads, transportation costs, etc.)</li> <li>• Fuelwood is extracted to late in the year to allow sufficient drying</li> </ul>	<ul style="list-style-type: none"> <li>• Land seems available to set up tree plantations</li> <li>• Proper management of coppiced forests for fuelwood production</li> <li>• Villagers interested to protect and manage their own forest for fuelwood supply</li> <li>• Forest regeneration expected now Moratorium is in place</li> <li>• Cleaning and thinning operations: former operations left about 30-50% of biomass in the forest</li> </ul>

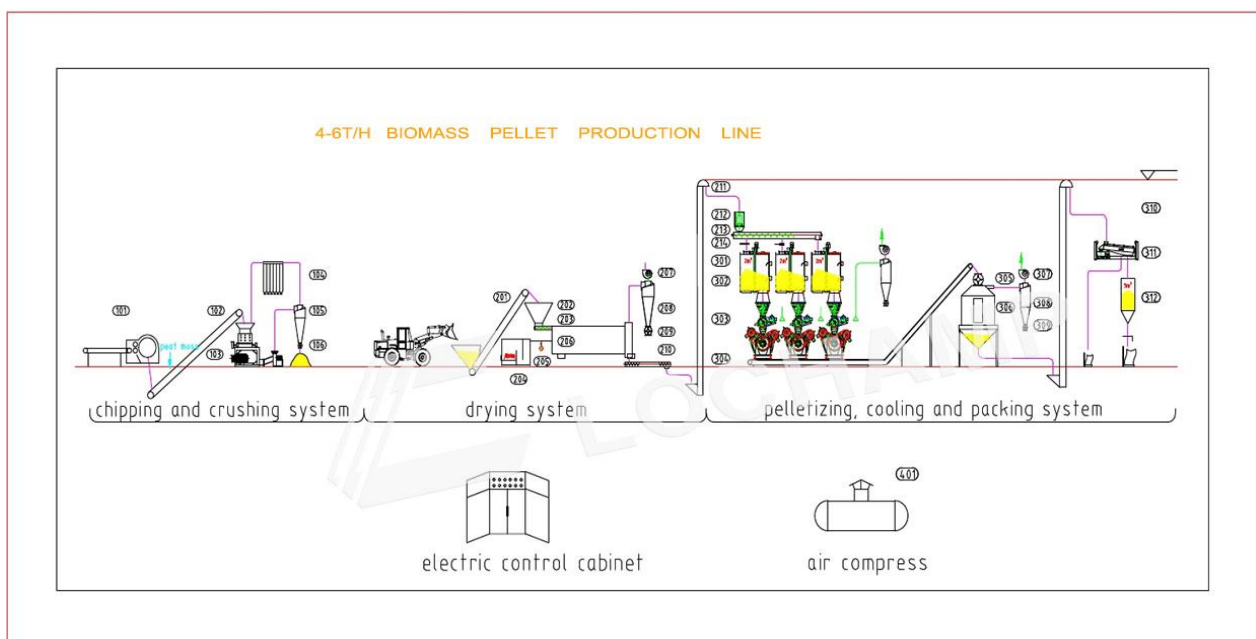
**Wood biomass value chain analysis: Pellets- Production, post-harvest care and processing**

There are several pellet companies operational in Albania since 2008 which have a production range of about 2,000 tons to 15,000 tons per year. Many of the pellet companies are part of a wider logging-wood-processing company with the waste and sawdust of the wood processing plant used for the production of pellets. In this way efficient use is made of the wood biomass. Although the production is about 2,000 to 15,000 tons pellets per year, companies expressed that the capacity of their pellet plants is up to 3 times higher. Their main problem is the lack of materials. Since the Moratorium is in place they can no longer have logging contracts and have thus no direct access to raw materials. As a consequence, wood processing companies in Skhoder imported higher quantities of logs from Montenegro but this is no longer possible since Montenegro put a ban on the export of logs/ unprocessed wood. The import of logs is also expensive due to high transportation costs and often time consuming because of the bureaucratic procedures involved. Sawdust is considered industrial waste and can therefore not be imported. It is also more difficult to get sawdust from carpenters as their business has also been affected by the new forest policies. Products made by carpenters have become more expensive since the price of wood has increased due to the new forest legislation. As a consequence their sales also decreased and their production therefore there is less wood waste and sawdust available for making pellets. There is thus a dire need to increase access to wood biomass. The Albanian government could for example try and make agreements with other neighbouring countries to ensure the import of affordable wood biomass, lease out forest land and provide incentives/ financial support to logging/ wood processing companies to establish tree plantations or give long-term forest concessions to these companies. Another option might be the use of agricultural waste (such as: stalks, straw, shells and husks) as a source of raw material for pelletizing instead of wood biomass. But this might require adjustments to the wood biomass pellet line.

The pellet production line consists of several main components:

- 1) **Chipping and crushing:** First the raw materials are chipped and crushed with a wood chipper and a hammer mill. After milling the wood material has a size of 3-5 mm.
- 2) **Drying:** The crushed materials will be dried to the appropriate moisture content. Drying is one of the most important components to make pellets of premium quality. A final moisture content of 12-16% is suitable in most wood pellet production systems. A higher moisture content could result in pellets that easily split and a lower moisture content could cause problems during the pelletizing process.
- 3) **Pelleting:** This is the key process of pellet production plant.
- 4) **Cooling:** The temperature of the wood pellets is between 60°C and 80 °C while the moisture content is close to 15% after the pelletizing process. A cooler must be used to reduce the temperature to about 3-5°C higher than the room temperature which makes the fresh pellets hard and dry. Cool air flows from bottom to the top, while the pellets drop from top to bottom and in the process the pellets cool down.
- 5) **Packing:** The packing machine is often a combination of automatic weighting, filling, and packing and is the final process of pellet production.

Figure 9 below gives a schematic overview of a pellet production line. At present there is no maintenance and mechanical support nor spare parts for the pellet production line available in Albania. Support has to be sourced from abroad. Also the certification of pellets has to be carried out by certifiers from abroad. Several pellet companies have their pellets certified in order to meet customer demands.



(<http://www.lochamp.com/wood-pellet-line.html>)

**Figure 9: Main components of a biomass pellet production line**

The demand for pellets is at present higher than the supply. Some of the pellet companies have annual contracts with institutions such as schools and hospitals with central heating systems for the installation of machineries, maintenance of these machineries and the required pellets. Central heating systems in institutions such as schools and hospitals have proven to be much more efficient than the old woodstoves. The Ministry of Environment therefore encourages the installation of central heating systems in institutions and the replacement of old inefficient fuelwood stoves. This

provides opportunities for pellet companies to enter into contracts with municipalities and ensure a sustainable supply of pellets.

The main challenges and opportunities in pellet production and processing are summarised in table 6.

**Table 6: Challenges and opportunities in pellet production and processing**

Constraints	Opportunities
<ul style="list-style-type: none"> <li>• No supply of wood materials / no contracts for logging because of Moratorium</li> <li>• Sawdust considered as industrial waste and therefore not possible to import</li> <li>• Transport costs are high to get sawdust/ wood from elsewhere</li> <li>• Because of Moratorium products of carpenters have become more expensive → less sales → less waste → less materials for pellet plants</li> <li>• New law in Montenegro (Dec 2016) implemented: Ban on export of unprocessed wood</li> <li>• No maintenance/ mechanical support/ spare parts for pellet factory available in Albania</li> </ul>	<ul style="list-style-type: none"> <li>• Contracts with municipalities for pellet production for institutions</li> <li>• Agreements with other countries to ensure imports of wood(biomass)</li> <li>• Expanding forest processing plants with pellet plants to process wood waste into pellets</li> <li>• Set up tree plantations by logging/ wood processing companies (forest concessions/ leasing of forest land)</li> <li>• Use agricultural waste instead of wood biomass for pellets?</li> </ul>

**Wood biomass value chain analysis: Marketing and trading**

There is a high demand for both fuelwood and pellets. The marketing of fuelwood is said to be highly informal and characterises about up to 80-90% of the market share. In Shkoder it was mentioned that only 16 from the 435 exporting logging companies had formal licences until 2012 when it became compulsory to show certificates of origin. By that time the forests had already been severely degraded and most informal companies ceased to exist.

At household level people often contact local loggers for their fuelwood supply for domestic use in the form of a truckload. The load is often brought in the early morning hours to avoid the checks and controls of the Forest Inspectorate. Also often wood suitable for timber is sold as firewood. Buying a truck load in this is cheaper but people have to chop the wood themselves or arrange someone to do it for them. Making the arrangements and contacting local loggers to supply fuelwood turns also often turns out to be cumbersome. Companies that follow the legal procedures are disadvantaged because they have to ask higher prices to cover their payments of taxes.

Prices for fuelwood have increased substantially over the last couple of years from about 2,200 to 3,000 ALL in 2015 to 4,000 ALL per stacked m<sup>3</sup> in 2016. Of course fuelwood is cheaper in some regions compared to others. For example the price for fuelwood increased to 4,000 ALL and even up to 7,500 ALL per stacked m<sup>3</sup> for good quality fuelwood in Shkoder municipality, while fuelwood is available for 2,500/ 3,000 ALL per stacked m<sup>3</sup> in Kukes region. At present it is still more economical to heat homes with fuelwood than gas or electricity in most cases but it is expected that prices of fuelwood will continue to raise now the Moratorium is in place. Some companies expected to raise the price to 8,000 ALL per stacked m<sup>3</sup> in case fuelwood has to be imported from abroad. Following

the Moratorium, a wood processing company in Korca imported fuelwood in 2016 but incurred severe losses because the government made an amendment and permitted special projects for the extraction of fuelwood. Legislations have to be predictable and strictly followed otherwise the market will be distorted and market players do not have equal opportunities .

The export of fuelwood continues and even increased from 2014 to 2015 by 29% from 68,523 m<sup>3</sup> to 88,142 m<sup>3</sup> despite the declining forest condition and a high internal demand for fuelwood and makes up about 90% of all wood exports according to figures from the General Custom Directory. On the other hand Albania also imports a small volume of fuelwood of 3,705 m<sup>3</sup> in 2015 which is a sharp decrease of 57% compared to the previous year (8,706 m<sup>3</sup>). See figure 10 and 11 for respectively the export and import of fuelwood. The figures also show the quantities of the export and import of charcoal and untreated wood to give an indication of the relative importance of fuelwood.

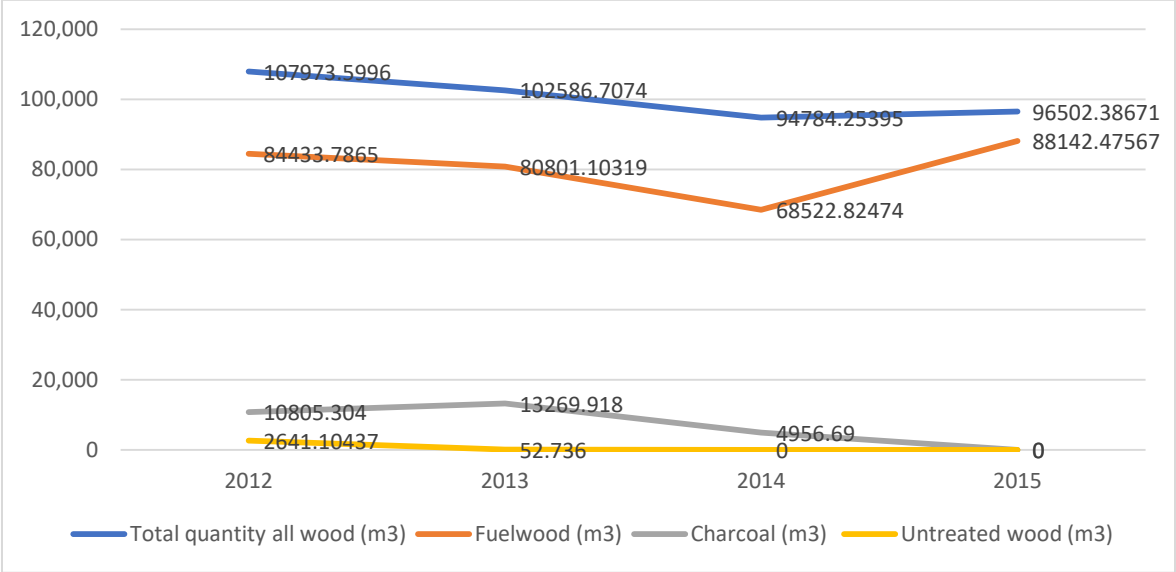


Figure 10: Export of fuelwood<sup>6</sup>

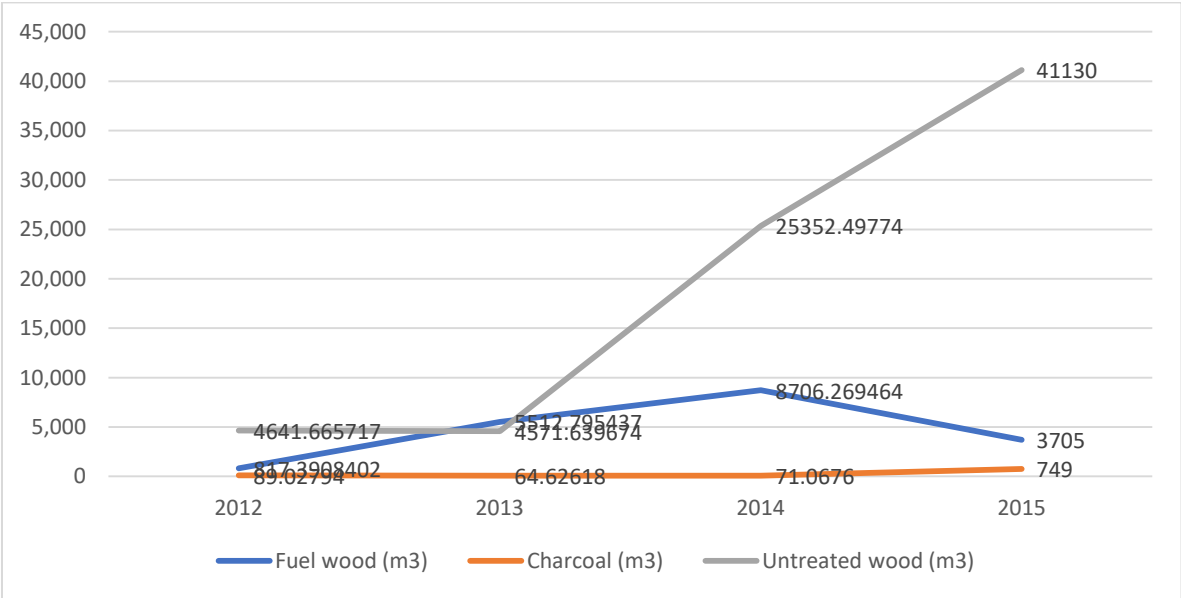
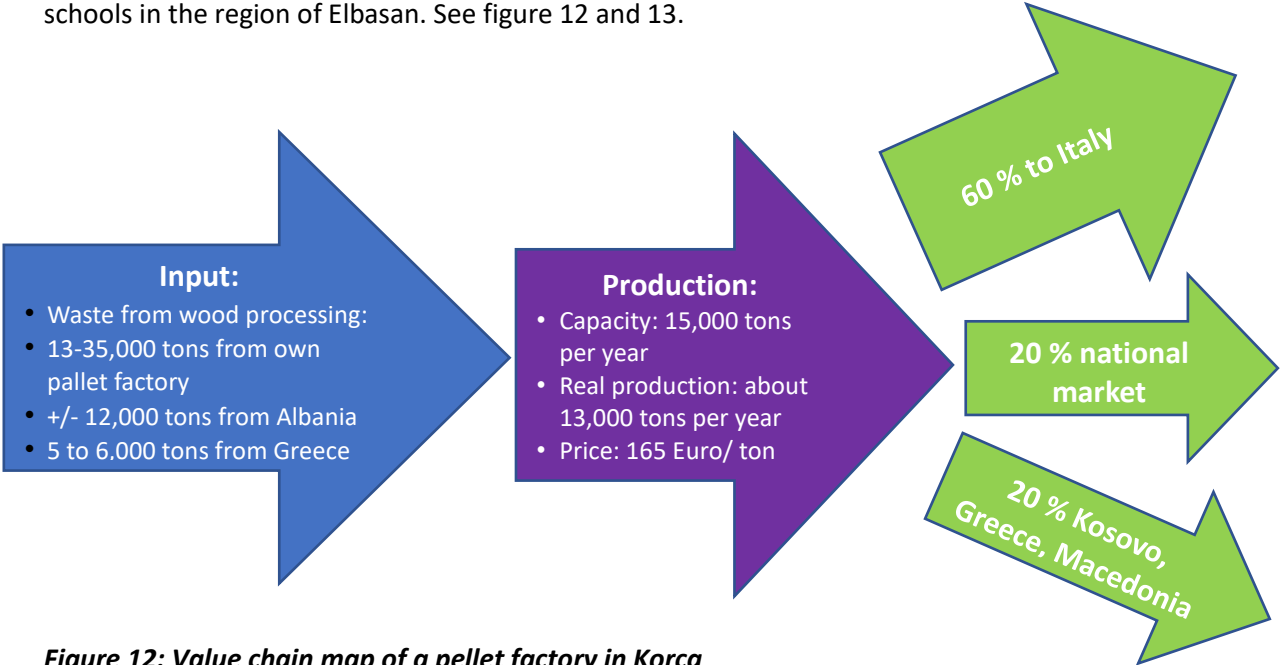


Figure 11: Import of fuelwood<sup>7</sup>

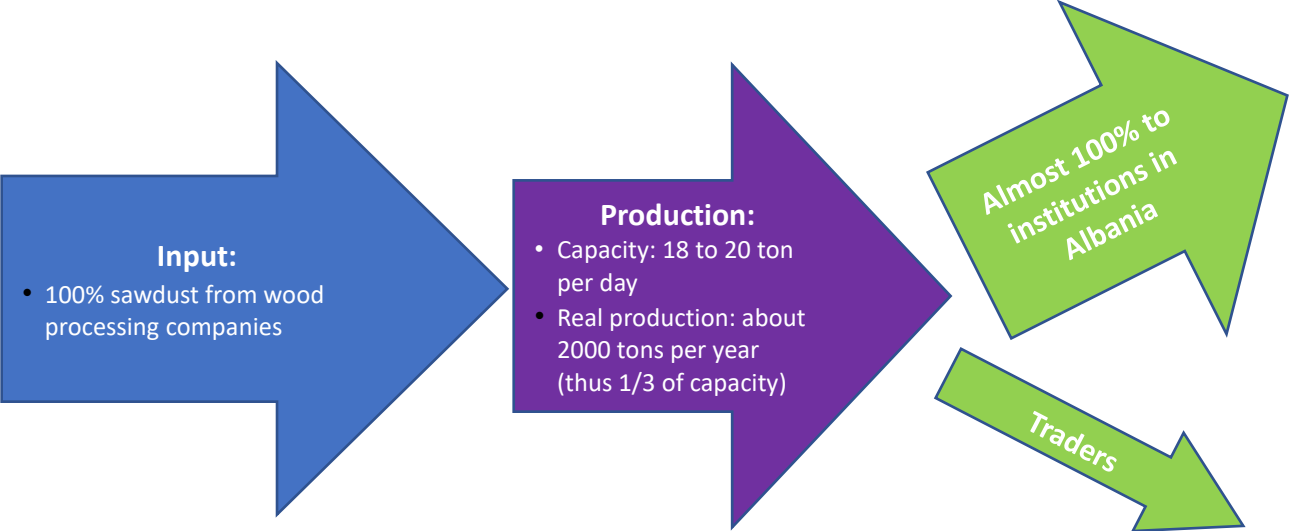
<sup>6</sup> Data available at: <http://www.instat.gov.al/al/themes/mjedisi.aspx?tab=tabs-5>

<sup>7</sup> Data available at <http://www.instat.gov.al/al/themes/mjedisi.aspx?tab=tabs-5>

There is a large demand for pellets both in Albania and abroad with the demand exceeding the present supply. Most pellet companies export their pellets to countries such as Italy, Greece, Macedonia and Kosovo. The price for pellets linger about 165-180 Euro per ton. Other companies have annual contracts with institutions with central heating systems (these are public contracts agreements based on bidding processes). These annual contracts include an entire package to supply pellets, required machineries (including boiler and burner<sup>8</sup>) and the provision of maintenance. The pellet company in Elbasan has such contracts with 6 hospitals and about 20 kindergardens and schools in the region of Elbasan. See figure 12 and 13.



**Figure 12: Value chain map of a pellet factory in Korca**



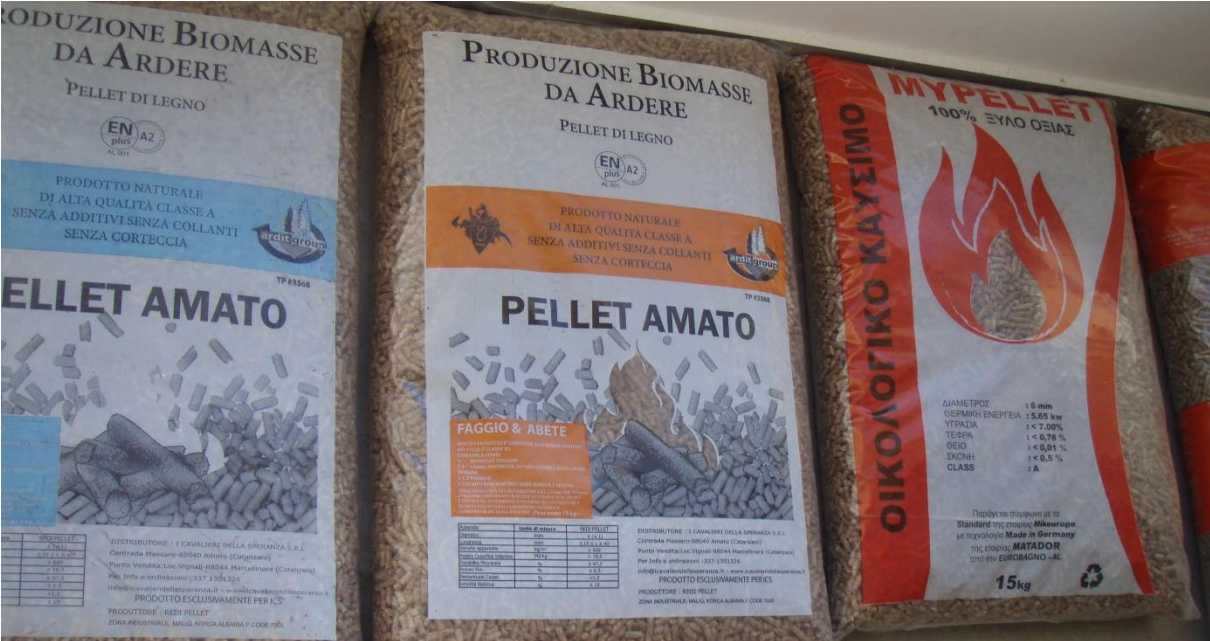
**Figure 13: Value chain map of a pellet factory in Elbasan**

The pellet companies do not face many issues related to marketing, their main concern is the access to materials to make pellets and the changing regulations on which they are not consulted nor have

<sup>8</sup> Sometimes only the burner and not the boiler is supplied according to the contract. However, a boiler is very important because it gives much more power to the heating system.



any influence. However, it was mentioned that the procedures for the import of materials and export of pellets can be bureaucratic and therefore time consuming. At present there are no taxes on wood imports apart from VAT.



**Pellets for different buyers**

Table 7 provides an overview of the main constraints and opportunities in marketing fuelwood and pellets.

**Table 7: Challenges and opportunities in fuelwood and pellet marketing and trading**

Constraints	Opportunities
<ul style="list-style-type: none"> <li>Marketing of fuelwood/ wood largely informal up to 80-90% (even only 16 from the 435 exporting logging / wood companies had licences in Shkoder until 2012 )</li> <li>Prices for fuelwood increased severely and are expected to increase even more (e.g. 2,500- 3000 ALL/ m<sup>3</sup> stacked in 2015 to 4,000 ALL / m<sup>3</sup> stacked in 2016)</li> <li>Fuelwood price if wood is imported around ALL 800 / m<sup>3</sup> stacked</li> <li>Timber sold as fuelwood</li> <li>Bureaucracy esp. in import / export is time-consuming</li> </ul>	<ul style="list-style-type: none"> <li>Control of informal market because of Moratorium</li> <li>Huge demand for fuelwood/ pellets</li> <li>Use of fuelwood remains cheaper than gas/ electricity?</li> <li>No taxes for wood imports only VAT</li> </ul>

## Wood biomass value chain analysis: Consumption

Almost all households in rural areas depend on fuelwood for heating and cooking. Depending on the climate, weather, location (altitude and aspect) and size of the family, households in rural areas use about 7 to 10 m<sup>3</sup> fuelwood per year. In urban areas the amount of used fuelwood is often much less and lingers around 4 to 5 m<sup>3</sup>. People in urban areas mostly use fuelwood only for heating, for cooking other energy sources such as gas and electricity. The most preferred tree species for fuelwood use is beech followed by oak. Sometimes good timber is used as fuelwood. At present the costs for heating by using fuelwood is in most cases still cheaper than the use of electricity or gas especially if the house is heated for the entire day. Therefore, people still prefer fuelwood over other energy sources. Also the warmth provided by wood is preferred over the often dry heat from gas or electricity. However, the use of wood as energy source might decline if wood becomes scarce and expensive. People expect to convert to other sources of energy if they become cheaper than wood. The Trans-Atlantic Pipeline (TAP) which is currently being installed might provide opportunities to cheaper access to gas. However, gas is a non-renewable and a high carbon energy source and its use should therefore not be promoted.

Fuelwood is also often used in institutions such as schools and offices as energy source. Schools are entitled to use 3m<sup>3</sup> fuelwood per classroom per year for the period from 15 November to 15 March. At present most schools have one woodstove per classroom. The woodstoves used are often old and not very efficient, while the buildings are often poorly insulated. Some new built schools have installed a much more efficient central heating system based on fuelwood with support of donor funds because such installation is rather costly. Proper insulation is also very important. A well-insulated building can increase energy savings by 40 to 50%. An example of a school with a wood central heating system is a primary school in Melan, Diber region. A school in Kukes region converted to petrol for heating purposes but switched back to the use of fuelwood because petrol turned out to be too expensive.

Fuelwood is also used by restaurants. Some of the traditional restaurants use different species of fuelwood for the preparation of dishes because tree species give different taste and smell to the food. Oak wood gives for example a nice smell and taste to meat while beech wood is mostly use for the preparation of traditional bread as it produces less smoke.

As stated before in this report, the demand for fuelwood exceeds the supply. Forests need to regenerate and be properly managed to increase the fuelwood supply for consumption. As one forest expert at the municipality mentioned: "We have the will to work but can't do more and can't hurry the trees to grow". The misbalance between demand and supply is therefore expected to continue to exist or even to grow as less fuelwood might be available in the few years directly after thinning operations.

The use of pellets is getting increasing momentum although costs for a pellet stove are high from 750 to 1,500 Euro (February 2017). Several institutions have installed central heating systems based on pellets. The pellet central heating system in the hospital in Diber works rather well. People are content with the system because the hospital rooms are warm, even in the severe winter of 2016/2017, and there is no pungent smell nor pollution compared to their former petrol heating system. The heating system works less well in Korca where people are disheartened because the hospital rooms remain cold. The capacity of the system installed in Korca seems insufficient to heat all the buildings and rooms of the hospital. Moreover, the Korca hospital is not insulated and a lot of heat is lost. The establishment of district heating systems could provide an opportunity to increase



energy efficiency at a larger scale. The Ministry of Environment encourages the use of central heating systems in institutions.

Central heating systems with pellets or fuelwood as input are also more and more used by the private sector such as hotels for heating the guest rooms. Also private households use more and more pellet and wood saving stoves as they are more energy efficient (energy efficiency is an expression of how well the stove converts the energy of the wood into heat) and produce less smoke and ash. Especially old and inefficient woodstoves produce smoke and ash and have therefore high rates of particulate emissions with negative health effects. There are a number of labels that give an indication of the energy efficiency and particulate emissions of a wood stove. The CE label shows that the wood burning stove meets the European Union's standard EN13240. CE stands for Conformité Européenne which means European agreement or uniformity. Woodstoves carrying the CE label must have an energy efficiency of at least 50% and the carbon monoxide emissions mustn't exceed 1.0 %. The Nordic ecolabel is more strict with a minimum energy efficiency of 76%, below 3 grams per kilogram particle emissions in wood burning stoves (and below 2 grams from 2017 onwards) and carbon monoxide emissions must not exceed 1250 milligrams per cubic metre to name a few of the criteria (See <http://www.tips.adurofire.com/knowledge-and-useful-advice/environment-and-regulations/standards-and-certifications-of-wood-burning-stoves/>). Efficient fuelwood stoves and pellet stoves are becoming more readily available on the market as well as pellets because of the growing demand.



***Old wood stove in an office (left) and pellet stove (right)***

One of the main disadvantages of pellet stoves is that they require some electricity to operate and require professional maintenance. Therefore, pellet stoves are not suitable in remote areas where there is no or no stable electricity supply. Table 8 gives an overview of the advantages and disadvantage of both wood stoves and pellet stoves. Table 9 gives an overview of the main constraints and opportunities encountered in the use of fuelwood and pellets.



**Table 8: Advantages and disadvantages of wood stoves and pellet stoves**

	Disadvantages	Advantages
<b>Wood stoves</b>	<ul style="list-style-type: none"> <li>• Less efficient</li> <li>• More ash and smoke</li> <li>• Can be messy and require more space</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of fuelwood</li> <li>• Natural flames</li> <li>• Can be used everywhere</li> </ul>
<b>Pellet stoves</b>	<ul style="list-style-type: none"> <li>• High investment costs (750-1500 Euro)</li> <li>• Pellet stoves require maintenance</li> <li>• Produced flames are smaller</li> <li>• Pellets not widely available</li> <li>• Pellet stoves require electricity</li> </ul>	<ul style="list-style-type: none"> <li>• High efficiency (up to 90%)</li> <li>• Little ash (ash content of burnt pellets is just 0.5 to 1%)</li> <li>• Pellet stoves are easy to use</li> <li>• Bags of pellets easy to store</li> <li>• Pellet stove installation needs only a small exhaust pipe</li> </ul>

**Table 9: Main constraints and opportunities in the use of fuelwood and pellets**

Constraints	Opportunities
<ul style="list-style-type: none"> <li>• Fuelwood stoves used often inefficient</li> <li>• Fuelwood efficient / pellet stoves more expensive (e.g. 750 to 1,500 Euro for a pellet stove)</li> <li>• Buildings often poorly insulated</li> <li>• High investment costs for central heating / thermal insulation</li> <li>• Sometimes good timber is used as fuelwood</li> <li>• Pellet stoves require use of electricity</li> <li>• Particulate emissions from burning wood biomass (especially old wood stoves)</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing trend in using efficient central heating systems (pellets/ wood) in institutions (schools/ hospitals)</li> <li>• Increasing trend in private businesses (hotels/ restaurants)/ households using central heating system with wood/ pellets</li> <li>• Pellets, pellet stoves, efficient wood stoves more readily available locally</li> <li>• Thermal insulation can increase energy savings by 40-50%</li> <li>• Central district heating?</li> <li>• Trans-Atlantic Pipeline can provide opportunity for using gas (but not renewable and high carbon energy source)</li> </ul>

### Wood biomass value chain analysis: Main conclusions

Fuelwood is the most important source of energy for heating and cooking in rural areas and to some lesser extent in the cities and towns of the regions of Diber, Korca, Kukes and Shkoder. Wood biomass could provide a good source of renewable and low carbon energy if derived from sustainably managed forests. Unfortunately Albanian forests suffered from poor management, protection and/or forest fires and as a consequence forest resources have become seriously degraded in many areas. In an effort to change the situation and protect the forests, the Albanian government has installed a Moratorium banning all logging apart from required thinning and sanitary forest operations based on operational forest management plans. Furthermore, according to the new forest regulations Municipalities are solely responsible for the fuelwood supply to both citizens and institutions within

their area. They have two options, either they set up their own structure and implement all activities from fuelwood collection to marketing or they can contract a logging company (using a tender process) to do the thinning and cleaning operations. In the last scenario logging companies must leave the fuelwood at the road head while the municipalities are responsible for transport and marketing. Many municipalities haven't taken yet full ownership of this new role and mandates and give low priority to forestry issues. Besides, Municipalities but also the Forest Inspectorate lack capacities, funds and infrastructure to fulfil their new roles and mandates properly. The procedures for people who want to manage and use their traditional forest land remains unclear, especially if they are living within a protected area. Also there is no recognition of the role forest associations could play in for example the assessment of fuelwood needs, available resources (especially in traditional forest) and fuelwood supply to Municipalities.

One of the biggest challenges is that the demand for fuelwood is much higher than the potential supply through thinning and sanitary forest operations indicated in forest management plans. As a result prices for fuelwood increase and people turn to the informal market. The marketing of fuelwood is said to be already largely informal constituting up to 80% to 90% of the market share. Fuelwood prices have increased seriously over the last few years and raised from about 2,500 ALL per stacked m<sup>3</sup> to 4,000 ALL per stacked m<sup>3</sup>. If fuelwood has to be imported from abroad prices might even raise to or over 8,000 ALL per stacked m<sup>3</sup> and fuelwood will thus become more expensive than other sources of energy if this scenario becomes reality.

Despite declining forest resources, the export of fuelwood continues (88,142 m<sup>3</sup> exported in 2015) while the import of wood is expensive because of the travel costs. The management of natural forests for the sustainable fuelwood supply in Albania is also very expensive because it involves costly management planning and inventories, and the establishment of forest roads in inhospitable areas to name a few. The establishment of tree plantations or the management of coppiced forests for the fuelwood supply might be cheaper options.

The Ministry of Energy and Industry foresees only a minor role of wood biomass (maximum 1%) in its contribution to the target of 38% renewable energy resources by the year 2020. However, at the same time the use of central heating systems based on wood or pellets are promoted by the Ministry of Environment. Central heating systems and pellets are much more efficient, especially if at the same the buildings are well insulated as proper insulation can reduce the loss of energy by 40 to 50%.

Pellet companies are severely impacted by the new forest legislations as they face difficulties in accessing wood, sawdust and other sources of wood biomass for making pellets. Their production is at present lower than the capacity of their plants. Pellet companies in Shkoder region are also affected by the export ban on logs imposed by the neighbouring country Montenegro and consider moving to Montenegro to ensure access to raw materials.

The demand for pellets is at the moment higher than the supply. Pellets are exported to countries such as Italy, Kosovo, Greece and Macedonia and sold on the market. Some pellet companies have annual contracts with institutions such as schools or hospitals for the installation and maintenance of equipment and pellets.

In summary, wood biomass has the potential to form a good source of renewable and low carbon energy if well regulated. The new forest regulations on one hand will help to stop illegal logging by companies but on the other hand lead to a shortage of fuelwood for citizens and institutions, and wood biomass resources to be used by pellet companies. In the next chapter approaches are described that could be followed in support of wood biomass value chains.

## 5. Approaches in support of wood biomass value chains

This chapter describes several approaches in support of wood biomass value chains. These approaches are categorised in the following five directions: 1) Enabling policy environment, 2) Service delivery, cooperation and coordination, 3) Forest management, 4) Marketing and trade, and 5) Research and feasibility studies.

### Enabling policy environment

Secured long-term access to fuelwood by traditional forest users: People who have long-term interests and directly benefit from forest resources are also the people who are most motivated to protect and manage the forest in a sustainable manner. Therefore, it is important that the government recognises user/ property rights of local farmers over traditional forest land. Especially villagers who protected and managed their traditional forests have a good opportunity to produce wood biomass/ fuelwood in a sustainable way. Their forest consists mainly of low broadleaf forest with beech and oak, which are preferred species for fuelwood. Due to their location near villages, there is a good opportunity for them to sell fuelwood and create additional income from their well protected and managed forests. At present traditional forest users lack mostly official papers stating their user/ property rights, while securing these rights will further encourage farmers to invest time and resources in the protection and management of their forestland. This process of forest decentralisation starts with the registration of forest land in the name of the municipalities. Funds are made available under the Environmental Services Project (ESP) in support of this process. Further decentralisation from the municipality to the forest user will involve a process including: 1) Participatory mapping and identification of users, 2) Participatory boundary demarcation, forest management planning based on existing Communal Forest and Pasture management plans, and parcel description, and 3) Preparation and issuance of user right contracts and maps. CNVP has developed a functional process that can be used and followed for this decentralisation process. See also their story on their experiences: “Securing user rights over communal forests and pastures- impacts and lessons learnt from Albania”.

Secured long-term access to wood biomass by forest/ pellet companies: Also forest/ pellet companies are more inclined to invest and manage forests in a sustainable manner if they have long-term forest concessions of at least several (3-5) harvesting rotation cycles (for example 30 to 50 years). Therefore, it is recommended that the government allows forest companies to have long-term concessions with clear criteria on low impact logging. In case, companies are not interested in long-term forest concessions because of the poor forest condition, another option could be the long-term (30-50 years) lease of degraded forest land/ abandoned land. In that way, forest companies could establish tree plantations with fast growing species for energy production and benefit from several tree rotations.

Promotion of import and ban on export of wood biomass: The export of fuelwood continues although the (formal) supply of fuelwood is lower than the demand within the country and fuelwood imports are expensive. A ban on the export of fuelwood may therefore be appropriate. Also the government could negotiate agreements with neighbouring countries on affordable wood / sawdust imports. Sawdust could be considered as a resource for the production of pellets instead of as industrial waste which is not permitted to be imported. It is of high importance that pellet companies have access to wood biomass for the production of pellets because pellets are more energy efficient and have therefore the potential to reduce fuelwood demands.

Replacement of inefficient wood stoves by more efficient heating systems: At present many institutions, such as schools and offices use old and inefficient woodstoves. The government could



consider replacing all these old stoves with newer wood-efficient stoves and/ or install central heating systems based on fuelwood or pellets within the coming 5 years. Also the government could give financial incentives or fiscal benefits to promote the installation of improved wood or pellet stoves, central heating systems and/ or thermal insulation.

Support to Municipalities: Municipalities need to have sufficient funds and infrastructure to carry out their new roles and mandates in forestry. At present Municipalities do not have/ allocate sufficient budget to fulfil the required tasks and meet the fuelwood demands of their citizens and institutions. For example, special programs or subsidies might be required to support poor and remote areas without sufficient fuelwood resources.

Support to the Forest Inspectorate: Also the Forest Inspectorate need to have sufficient funds and infrastructure to carry out forest monitoring and patrolling activities. At present, they lack uniforms, vehicles and other equipment to carry out their duties properly.



**Traditional forest**

**Service delivery, cooperation and coordination**

Increased collaboration and coordination between ministries and municipalities: Better collaboration and coordination is required between different ministries, including the Ministry of Energy and Industry, the Ministry of Environment the Ministry of Agriculture, Rural Development and Water Management and Municipalities to implement the National Action Plan for Renewable Energy Resources (2015-2010). The action plan foresees re-forestation of at least 2200 ha annually as well as contributions from agricultural biomass as source of renewable energy in order to reach the country's target of 38% renewable energy by the year 2020. This can only be realised if there is close cooperation among the ministries and municipalities.

In the same line, ministries should work together and plan how to reduce the dependency on fuelwood and reduce the amounts of fuelwood used at both the national and municipality level. This could be in the form of programs on promoting energy efficient wood/ pellet stoves, central heating systems, district heating and or alternative sources of energy. Old and inefficient wood stoves used within institutions should be replaced as mentioned in the sub-chapter above on the enabling policy environment.

Collaboration with Forest Associations: Forest Associations could play an important role in wood-biomass value chains because they have a good understanding of the forest situation and are locally present. Forest associations could play a role and support municipalities in: 1) Awareness raising, 2) Assessing fuelwood needs, 3) Development of annual utilisation plans, 4) Training in forest management and 5) Decentralisation of forest lands to households with customary rights over these forest lands and 6) potentially other relevant topics depending on local needs. For example forest associations could play a brokering role and support local people with traditional forest land in good condition to sell fuelwood to the municipalities. Furthermore, Federations could play an important role in advocating and lobbying for increased energy efficiency.

Meetings between pellet companies, Ministry of Environment and Municipalities: Pellet companies play an important role in making pellets locally available and are crucial in reducing the dependency on fuelwood because pellets can be made out of wood waste and pellets are more energy efficient. However, pellet companies are severely impacted by the new forest legislations because it has become difficult to access raw materials for the production of pellets. Until now pellet companies have not been consulted related to the new forest policies. Discussions between the pellet companies and ministries are necessary to find solutions for the lack of access to raw wood-biomass for making pellets. Moreover, these meetings are important to assess the potential role of pellet companies in supplying pellets to institutions and future prospects on the role pellet companies could play in reducing the dependency and use of fuelwood.

Service delivery of Municipalities: Municipalities are expected to provide fuelwood to both citizens and institutions but most municipalities have not yet taken full ownership of this new role. Therefore, awareness raising of municipalities is needed to make sure that municipalities fully understand their new mandates, recruit appropriately trained staff for the new forest structures and allocate sufficient resources to forest activities. As mentioned before, it is also important that municipalities receive sufficient budget and infrastructure to fulfil the new tasks given to them properly. Besides it is of importance that contracts for fuelwood extraction are given to companies that have licenses for at least 10 years and have the equipment and skills to carry out the tasks. Now it sometimes happens that contracts are awarded to people/ organisations who haven't much experience in logging.

## Forest management to increase production and productivity

Forest management planning: Proper forest management planning is needed to have a basis for the preparation of annual operational plans. These forest management plans should be multi-objective and take into account fuelwood needs and not only focus on the production of timber. ESP is in the process of developing guidelines for proper participatory and multi-objective planning and will support forest management planning in the field. Thinning and sanitarian operations to enhance forest growth are important sources of fuelwood. Also it is important to make use of the wood biomass left after forest logging operations (normally around 30% but up to 50% after illegal forest operations). In case forest management plans do not exist, partial forest management assessments could be made to bridge the time until forest management plans are developed and in place. Also

annual operational plans might not be required for traditional forests, coppiced forest or shrub land for the production of fuelwood. Some technical directions could suffice for these areas, while an forestry expert of the Municipality could monitor if these directions are implemented.

Reinvestment of fees/ tariffs into forestry: Municipalities receive funds from gathered fees and tariffs related to forestry. For example, forest users have to pay about 500 ALL per m<sup>3</sup> collected fuelwood (and follow harvesting procedures) to the administration units. According to regulations 80% of the collected funds should be reinvested in forestry but at present the funds are often used to pay salaries. The collected funds should be reinvested in (fuel)wood production activities such as thinning and sanitary operations or other activities along the wood biomass value chains and salaries should be paid from the State budget.

Different models on increased fuelwood production: Five different models have been identified to increase the fuelwood supply, including: 1) Collaboration between municipalities and traditional forest users for fuelwood supply, 2) Management of oak coppice forest, 3) Management of shrub areas, 4) Plantations with fast growing species and 5) Agro-forestry models.

- *Collaboration between municipalities and traditional forest users:* The traditional forest of many farmers is in very good condition because of their long-time protection and conservation by the farmers themselves. These farmers could sell fuelwood to the municipalities. Forest associations could support farmers in making assessments of the potential supply of their traditional forests and play a brokering role between farmers and municipalities.
- *Management of oak coppice forests:* Albania has an area of 295,440 ha coppiced forest. The value of coppiced oak forests are often underestimated because these forests do not provide valuable timber. However, coppiced oak forests can be sustainable sources of fuelwood if properly managed.
- *Management of shrub areas:* In Albania, 377,416 ha are considered as shrub land mostly characterised by *Arbustus unedo*. Also shrub areas can provide a sustainable supply of wood biomass for the production of wood chips if properly managed. For example, the wood-biomass of shrub areas could be harvested in rotations of 6 years.
- *Plantation with fast growing species:* There are areas of severe degraded forest areas and or abandoned lands available in Albania which could be used for the establishment of tree plantations with fast growing tree species. Plantations are more cost efficient for the production of fuelwood than the extraction of fuelwood from sustainably managed natural forests. Species that would be suitable for this kind of plantations are for example Poplar and Willow. Also *Paulownia tomentosa* was frequently mentioned as a potential fast growing species to be promoted. However, there are a number of disadvantages of this species. *Paulownia* grows very fast but exhausts soil and water sources, furthermore it seeds and sprouts profusely and has an extensive root system which makes it invasive and difficult to remove once planted. *Paulownia* also produces very soft wood which is not suitable to be used as fuelwood directly but could be used as wood biomass in pellets. *Pauwlonia* comes originally from China where it is mainly used for the production of Medium Density Fibreboard (MDF). In Albania, *Pauwlonia* is sometimes planted on agricultural land, which should be used for the production of agricultural crops. The National Forest Association and the Ministry of Environment campaign against the use of this species.
- *Agro-forestry:* Agro-forestry systems in which trees and agricultural crops are combined on the same piece of land could also be promoted. Especially pollarded trees such as willows combined



with crops are a good combination because the pollarded trees do not take away much sunlight for the crops. Also the use of living fences and hedgerows can form important sources of fuelwood. An example in this respect are the planting of poplar trees along the fields; the trees provide fuelwood but also act as wind breaks.



***Paulownia planted in an agricultural field in Diber region***

## Marketing and trade

The marketing and trade of fuelwood and pellets doesn't encounter many difficulties because demands are much higher than the supply. However, it is very important that the informal trade is curbed not only from an ecological and forest perspective but also from a marketing point of view. If the informal trade isn't stopped, forest companies following the legal procedures are disadvantaged because they have to pay taxes and higher prices for their wood, which distorts the market. . Of course the informal trade can only be stopped if there is sufficient and reasonable priced wood available on the formal market.

Also access to market information is important especially related to the import of affordable wood materials to be used in pellet companies and fuelwood since fuelwood has become scarce.

## Further research, studies and pilots

Further research, studies and pilots are required to get more insight in potential ways to increase the energy efficiency from wood biomass and to reduce fuelwood dependency. For example a feasibility study and pilot could be conducted on district heating in which a small city or part of a city is heated

by a central heating system fed by wood biomass. Also research could be carried out on alternative sources of renewable energy such as the use of: geothermal energy, pelleting of agricultural waste (such as for example straw, stalks, reed, nutshells, and olive pomace), solar, wind or other renewable energy sources.

Also studies should be conducted on the available and suitable areas for the establishment of tree plantations with fast growing species for wood biomass production. Further studies and pilots may also be required to gain experience in the recommended forest models as mentioned above: 1) Establishment of collaboration between municipalities and traditional forest users in fuelwood supply, 2) Management of coppiced forest for fuelwood supply, 3) Management of shrub areas for the production of wood chips, 4) Establishment of plantations with fast growing species for fuelwood production and 5) Agro-forestry models.

Finally research could be conducted on potential reductions in carbon emissions following strategies for reduced fuelwood dependency and increased energy efficiency. There is a potential to monetise reduced carbon emissions through compliance or voluntary carbon markets but the process is complicated. A first step into this process is to identify an appropriate methodology and to prepare a Project Idea Note (PIN) which aims at estimating the CO<sub>2</sub> emission reduction potential and costs, followed by the development of a full project design document. The entire process can be found on several websites, such as: <https://cdm.unfccc.int/> or <http://www.v-c-s.org/>

## 6. Annex 1: List of people and organisations met

Date	Name	Organisation	Place
9 Feb 2017	Xhelal Shuti	Regional Federation Kukes	Kukes
9 Feb 2017	Ilmi Gjana	Forest Service Kukes Municipality	Kukes
10 Feb 2017	Enver Meshi	Administrative Unit	Golaj
10 Feb 2017	Rushe Kola, Lirie Kastrati	Women Group	Golaj
10 Feb 2017	Smail Brati	Villager	Golaj
10 Feb 2017	Ibish Tobli, Islam Morina, Beshik Gjoni	Forest Inspectorate	Hasi
10 Feb 2017	Selim Lisha	Forest Service Hasi Municipality	Hasi
11 Feb 2017	Sani Hallui	Forest Inspectorate Kukes Region	Kukes
13 Feb 2017	Vullnet Tafa	Forest Service Diber Municipality	Peshkopi
13 Feb 2017	Muharem Balliu	Administrative Unit	Melan
13 Feb 2017	Zenel Shehi, Gazmir Mera	Regional Federation Diber	Peshkopi
13 Feb 2017	Haxhi Mani	Farmer-Muhur	Peshkopi
14 Feb 2017	Jolanda Rama, Edmond Sula	Vjecare School	Melan
14 Feb 2017	Raland Dedja, Arben Mera	Forest Service Bulqize Municipality	Bulqize
14 Feb 2017	Shkelqim Keshi	Pellet Factory	Bulqize
14 Feb 2017	Sali Vranezi	Fuel wood seller/ trader	Peshkopi
15 Feb 2017	Durim Kaba, Almira Xhembulla	CNVP (fuelwood users)	Peshkopi
15 Feb 2017	Astrit Lika	Forest Inspectorate	Peshkopi
15 Feb 2017	Ervin Hysa	Peshkopi hospital	Peshkopi
15 Feb 2017	Oreshka Aranit	Stove shop	Peshkopi
15 Feb 2017	Fehmi Buci	FPUA Sillove	Peshkopi
15 Feb 2017	Hyqmet Topuzi	Protected area Diber region	Peshkopi
16 Feb 2017	Sokol Kulla	Pellet factory Pogradec	Pogradec
16 Feb 2017	Flamur Cerra, Avni Mara	Forest Service- Pogradec Municipality	Pogradec
16 Feb 2017	Kico Shore, Piro Posani, Ruzhdi Hymetllari	Forest associations at regional and municipality level	Pogradec
16 Feb 2017	Dhimirer Domi	Farmer	Pogradec
17 Feb 2017	Marsel Nazifi	Forest Service- Maliq Municipality	Maliq
17 Feb 2017	Festim Lami	Pellet factory	Maliq
17 Feb 2017	Murat Pinderi, Aida Marko	Fuelwood company/ trader	Korca
17 Feb 2017	Niko Qirinxhi	Forest Inspectorate	Korca
17 Feb 2017	Johan Marko	Forest Service Korca municipality	Korca
17 Feb 2017	?	Korca hospital	Korca
20 Feb 2017	Florian Shabanaj	Pellet company FA&BI	Elbasan

21 Feb 2017	Ylli Hoxha	Ministry of Environment	Tirana
21 Feb 2017	Elvin Toromani, Nehat Gollaku	Forest Faculty	Tirana
21 Feb 2017	Bilal Sulo	National Agency of Natural Resource	Tirana
21 Feb 2017	Rexhep Ndreu, Arjol Lilo, Albora Kacani	Forest Association at national level	Tirana
22 Feb 2017	Edmond Terfhoya	Forest Inspectorate Shkoder Region	Shkoder
22 Feb 2017	Rikord Gjani	Eni-D. Wood processing/ pellet company	Shkoder
22 Feb 2017	Denisa Kapidanja, Rose Cane	Dafinor wood processing / pellet company	Shkoder
22 Feb 2017	Paulin Doda	Malesia Valtur Wood processing/ pellet company	Shkoder
23 Feb 2017	Aida Shllaku	Forest Service Shkoder Municipality	Shkoder
23 Feb 2017	Sokol Guri, Zaku Vrelq, Antonida Shala	Forest associations	Shkoder
23 Feb 2017	Gjon Gila	Hotel Tradita	Shkoder